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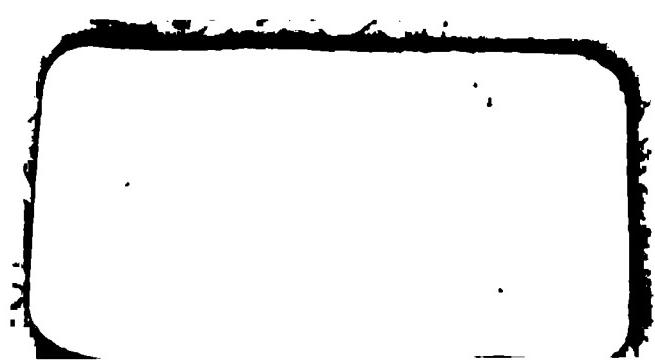
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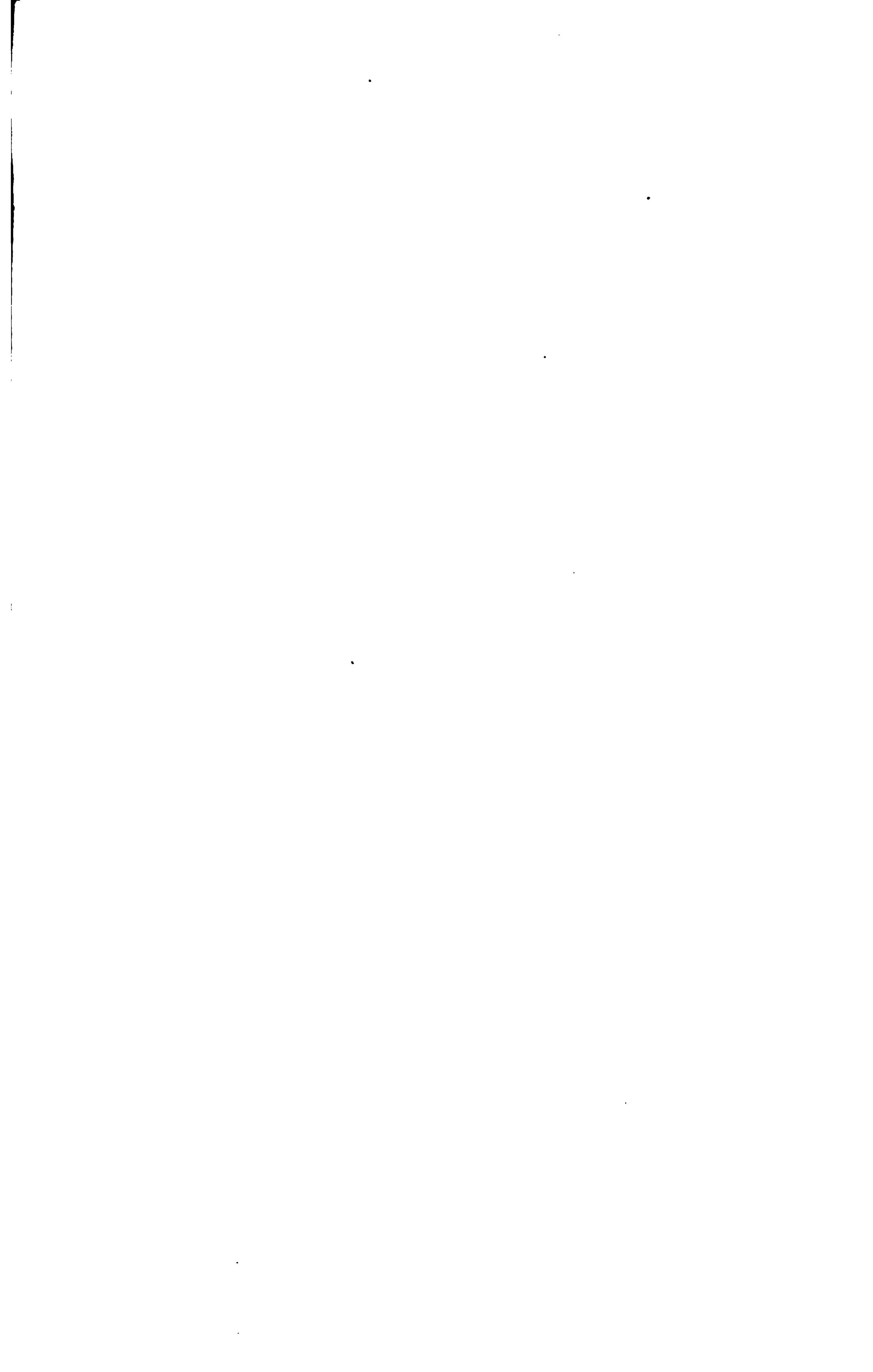
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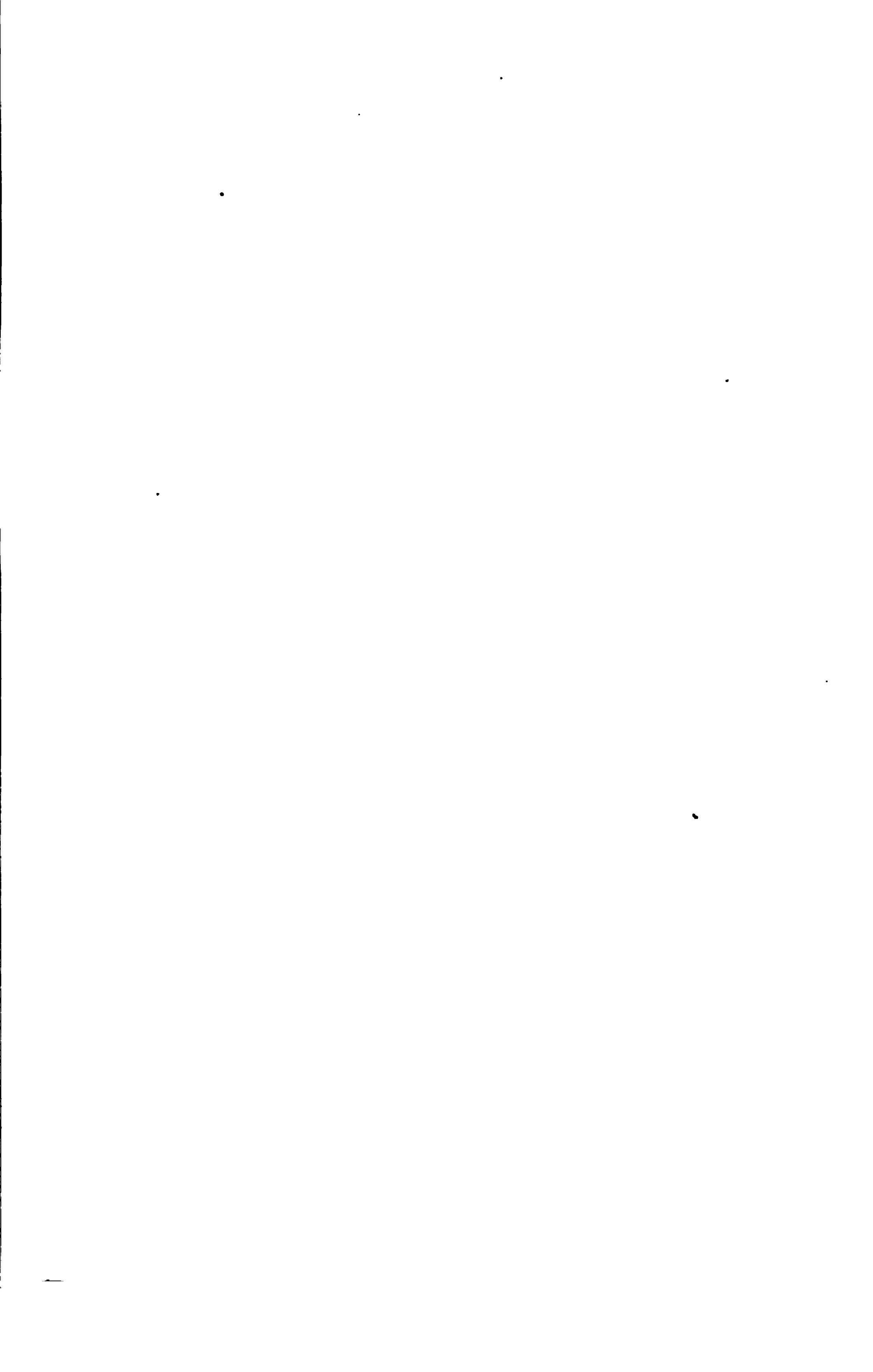
ARTHUR KEMBLE M. D.
SALEM, MASS.



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ANNUAL

OF THE

UNIVERSAL MEDICAL SCIENCES

**A YEARLY REPORT OF THE PROGRESS OF THE GENERAL
SANITARY SCIENCES THROUGHOUT THE WORLD.**

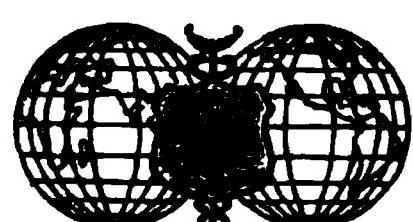
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TABLE OF CONTENTS OF VOLUME THIRD.

SURGERY OF THE BRAIN, SPINAL CORD, AND NERVES, . Section A

By LEWIS S. PILCHER, A.M., M.D.,

BROOKLYN,

Professor of Clinical Surgery in the New York Post-Graduate Medical School and Hospital, Surgeon to the Methodist Episcopal Hospital,

AND

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THORACIC SURGERY, Section B

By J. McFADDEN GASTON, M.D.,

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ASSISTED BY

J. McFADDEN GASTON, JR., M.D.,

ATLANTA,

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SURGERY OF THE ABDOMEN, Section C

By JOHN H. PACKARD, A.M., M.D.,

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HERNIA, Section D

By WILLIAM T. BULL, M.D.,

NEW YORK,

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AND

WILLIAM B. COLEY, M.D.,

NEW YORK,

Surgeon to New York Cancer Hospital; Assistant Surgeon to Hospital for Ruptured and Crippled.

DISEASES OF THE RECTUM AND ANUS, Section E

By CHARLES B. KELSEY, M.D.,

NEW YORK,

Professor of Diseases of the Rectum in the New York Post-Graduate Medical School and Hospital.

TABLE OF CONTENTS OF VOLUME THIRD.

SURGICAL DISEASES OF THE GENITO-URINARY APPARATUS IN THE MALE, Section F

BY E. L. KEYES, M.D.,

NEW YORK,

Consulting Surgeon to Charity and Bellevue Hospitals,
AND

EUGENE FULLER, M.D.,
NEW YORK.

SYPHILIS, Section G

BY J. WILLIAM WHITE, M.D.,
PHILADELPHIA,

Professor of Clinical Surgery in the University of Pennsylvania, Surgeon
to the University, German, and Philadelphia Hospitals,
AND

WM. HENRY FURNESS, 3D, M.D.,
PHILADELPHIA,

Assistant in the Department of Venereal Diseases in the University Hospital.

ORTHOPÆDIC SURGERY, Section H

BY LEWIS A. SAYRE, M.D.,
NEW YORK,

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AND

REGINALD H. SAYRE, M.D.,
NEW YORK,

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Consulting Surgeon to Hackensack Hospital.

AMPUTATIONS, EXCISIONS, AND PLASTIC SURGERY, . . . Section I

BY P. S. CONNER, M.D.,
CINCINNATI,

Professor of Surgery in the Medical College of Ohio and Dartmouth
Medical College, etc.,
AND

LEONARD FREEMAN, M.D.,
CINCINNATI,

Pathologist to the Cincinnati Hospital, Surgeon to Christi Hospital, etc.

FRACTURES AND DISLOCATIONS, Section J

BY LEWIS A. STIMSON, M.D.,
NEW YORK,

Surgeon to New York and Bellevue Hospitals; Professor of Surgery in
the University of the City of New York.

DISEASES AND INJURIES OF ARTERIES AND VEINS, . . . Section K

BY CHRISTIAN FENGER, M.D.,
CHICAGO,

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the Chicago Polyclinic, etc.

TABLE OF CONTENTS OF VOLUME THIRD.

v

ORAL AND FACIAL SURGERY, Section L

By RUDOLPH MATAS, M.D.,
NEW ORLEANS,

Visiting Surgeon to Charity Hospital, New Orleans; Demonstrator of
Anatomy in the Medical Department of the Tulane University of
Louisiana, etc.

SURGICAL MYCOSES, Section M

By ERNEST LAPLACE, M.D.,
PHILADELPHIA,

Professor of Pathology and Clinical Surgery in the Medico-Chirurgical
College; Surgeon to the Philadelphia Hospital.

SURGICAL DISEASES, Section N

By LOUIS McLANE TIFFANY, A.M., M.D.,
AND

RIDGELY B. WARFIELD, M.D.,
BALTIMORE.

TRAUMATIC NEUROSES, Section O

By J. A. BOOTH, M.D.,
NEW YORK,

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SURGICAL DRESSINGS AND ANTISEPTICS, Section P

By F. VAN IMSCHOOT, M.D.,
GHENT,

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ANÆSTHETICS, Section Q

By DUDLEY BUXTON, M.D., B.S., M.R.C.P.ENG.,
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Hospital, London.

VOLUME INDEX, Section R

REFERENCE LIST OF JOURNALS.



CONTENTS OF THE ENTIRE SERIES.

VOLUME I.

DISEASES OF THE LUNGS AND PLEURA. <i>Whittaker</i>	Section A
DISEASES OF THE HEART AND BLOOD-VESSELS. <i>Whittier and Greene</i>	Section B
DISEASES OF THE MOUTH, STOMACH, PANCREAS, AND LIVER. <i>S. Solis-Cohen</i> . .	Section C
CHOLERA; DISEASES OF THE INTESTINES AND PERITONEUM. <i>Griffith</i>	Section D
ANIMAL PARASITES AND THEIR EFFECTS. <i>Dolley</i>	Section E
DISEASES OF THE KIDNEYS, BLADDER, AND ADRENALS; URINALYSIS; DIABETES.	
<i>Lepine</i>	Section F
FEVERS. <i>Wilson and Eshner</i>	Section G
DIPHTHERIA, CROUP, PERTUSSIS, AND PAROTITIS. <i>J. Lewis Smith and Warner</i> .	Section H
SCARLET FEVER, MEASLES, VARICELLA, AND RÖTHELN. <i>Witherstine</i>	Section I
RHEUMATISM AND GOUT. <i>Davis</i>	Section J
DISEASES OF THE BLOOD AND SPLEEN. <i>Henry and Stengel</i>	Section K
VOLUME INDEX. <i>Devereux</i>	Section L

REFERENCE LIST OF JOURNALS.

VOLUME II.

DISEASES OF THE BRAIN. <i>Gray, Prichard, and Shultz</i>	Section A
DISEASES OF THE SPINAL CORD. <i>Obersteiner</i>	Section B
PERIPHERAL NERVOUS DISEASES, MUSCULAR DYSTROPHIES, AND GENERAL NEUROSES. <i>Sollier</i>	Section C
MENTAL DISEASES. <i>Rohe</i>	Section D
INEBRIETY, MORPHINISM, AND KINDRED DISORDERS. <i>Norman Kerr</i>	Section E
DISEASES OF THE UTERUS, TUBES, OVARIES, AND PELVIC TISSUES. <i>Montgomery</i> . Section F	
DISEASES OF THE VAGINA AND EXTERNAL GENITALS. <i>Baldy and Talley</i>	Section G
DISEASES OF PREGNANCY. <i>Lutaud</i>	Section H
OBSTETRICS AND PUERPERAL DISEASES. <i>Budin and Merle</i>	Section I
DISEASES OF THE NEWBORN. <i>Currier</i>	Section J
DIETETICS OF INFANCY AND CHILDHOOD; INFANTILE DISORDERS. <i>Edwards</i> . .	Section K
VOLUME INDEX. <i>Devereux</i>	Section L

REFERENCE LIST OF JOURNALS.

CONTENTS OF THE ENTIRE SERIES.

VOLUME III.

SURGERY OF THE BRAIN, SPINAL CORD, AND NERVES. <i>Pilcher and Lloyd</i>	Section A
THORACIC SURGERY. <i>Gaston</i>	Section B
SURGERY OF THE ABDOMEN. <i>Packard</i>	Section C
HERNIA. <i>Bull and Coley</i>	Section D
DISEASES OF THE RECTUM AND ANUS. <i>Kelsey</i>	Section E
SURGICAL DISEASES OF THE GENITO-URINARY APPARATUS IN THE MALE. <i>Keyes and Fuller</i>	Section F
SYPHILIS. <i>White and Furness</i>	Section G
ORTHOPÆDIC SURGERY. <i>Sayre</i>	Section H
AMPUTATIONS, RESECTIONS, AND PLASTIC SURGERY; DISEASES OF BONES AND JOINTS. <i>Conner and Freeman</i>	Section I
FRACTURES AND DISLOCATIONS. <i>Stimson</i>	Section J
INJURIES AND DISEASES OF ARTERIES AND VEINS. <i>Fenger</i>	Section K
ORAL AND FACIAL SURGERY. <i>Matas</i>	Section L
SURGICAL MYCOSIS AND TUMORS. <i>Laplace</i>	Section M
SURGICAL DISEASES. <i>Tiffany and Warfield</i>	Section N
TRAUMATIC NEUROSES. <i>Booth</i>	Section O
SURGICAL DRESSINGS AND ANTISEPTICS. <i>Van Imschoot</i>	Section P
ANÆSTHETICS. <i>Buxton</i>	Section Q
VOLUME INDEX. <i>Devereux</i>	Section R

REFERENCE LIST OF JOURNALS.

VOLUME IV.

DISEASES OF THE SKIN. <i>Van Harlingen</i>	Section A
DISEASES OF THE EYE. <i>Oliver</i>	Section B
DISEASES OF THE EAR. <i>Turnbull and Bliss</i>	Section C
DISEASES OF THE NASAL CAVITIES, PHARYNX, LARYNX, TRACHEA, AND OESOPHAGUS. <i>Sajous</i>	Section D
INTUBATION OF THE LARYNX. <i>O'Dwyer</i>	Section E
DISEASES OF THE THYROID GLAND. <i>Clark</i>	Section F
LEGAL MEDICINE AND TOXICOLOGY. <i>Draper</i>	Section G
MEDICAL DEMOGRAPHY. <i>Levison</i>	Section H
BACTERIOLOGY. <i>Ernst</i>	Section I
VOLUME INDEX. <i>Devereux</i>	Section J

REFERENCE LIST OF JOURNALS.

VOLUME V.

GENERAL THERAPEUTICS AND PHARMACEUTICAL CHEMISTRY. <i>Dufardin-Beau-metz and Dubois</i>	Section A
EXPERIMENTAL THERAPEUTICS. <i>Hare and Cerna</i>	Section B
ELECTRO-THERAPEUTICS. <i>Rockwell</i>	Section C
GYNÆCOLOGICAL ELECTRO-THERAPEUTICS. <i>Apostoli and Grand</i>	Section D
HYDROTHERAPY, CLIMATOLOGY, AND BALNEOLOGY. <i>Baruch and Daniels</i>	Section E
HYGIENE AND EPIDEMIOLOGY. <i>Wyman and Banks</i>	Section F
ANATOMY. <i>Poirier</i>	Section G
ANOMALIES AND MONSTROSITIES. <i>Sudduth</i>	Section H
PHYSIOLOGY. <i>Howell and Dreyer</i>	Section I
NORMAL HISTOLOGY AND MICROSCOPICAL TECHNOLOGY. <i>Sajous</i>	Section J
GENERAL INDEX. <i>Kyle and Devereux</i>	Section K

REFERENCE LIST OF JOURNALS.

SURGERY OF THE BRAIN, SPINAL CORD, AND NERVES.

BY LEWIS S. PILCHER, A.M., M.D.,
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SURGERY OF THE BRAIN.

CEREBRAL TOPOGRAPHY.

C. Winkler,⁵⁸³ has devised an elaborate system of cerebral topography. His fixed points are the glabella and the external occipital protuberance. From these points he draws two fundamental lines,—one sagittal, the other horizontal. He subdivides these by a number of auxiliary lines, dividing the skull into twenty panels, the points in the brain corresponding to these panels. The correctness of the scheme has been tested by various surgeons and its availability proven.

Langdon, of Oxford, Ohio,⁵⁴⁸ publishes the following method of determining cranial topography:—

Fig. 1 represents a direct profile view of the skull, one-half natural size, showing surgical landmarks and lines as designed by the author; also dotted outlines of principal dural vessels, from a photograph of actual skull, with lines *in situ*. (Owing to perspective, the Rolandic line, *F-G*, shows as a curve instead of a straight line as drawn; the posterior portion of *A-B* also conveys a similar impression). *A*. Base of external angular process of frontal, level with highest part of supra-orbital arch. *B*. External occipital protuberance. *C*. Greatest zygomatic convexity, above middle of arch, *C*. This arch, *C*, might be designated as the zygomatic "sub-arch," being the excavation in lower border of zygoma, just in front of the "tubercl" of its anterior root. The little arch may readily be located on the living subject, and its centre corresponds with the greatest zygomatic convexity. *D*. Upper extremity of zygomatic vertical line. *E*. Greatest convexity

of parietal eminence, in line with posterior margin of base of mastoid process. *F*. Upper extremity (concealed in this view; see Fig. 2) of parietal vertical line and of Rolandic line. *G*. Lower extremity of Rolandic line and intersection of fronto-parietal (*A-E*) and zygomatic vertical (*C-D*) lines. An inch trephine-opening at *G* will expose (1) the trifurcation of the anterior division of the middle meningeal artery; (2) the bifurcation of

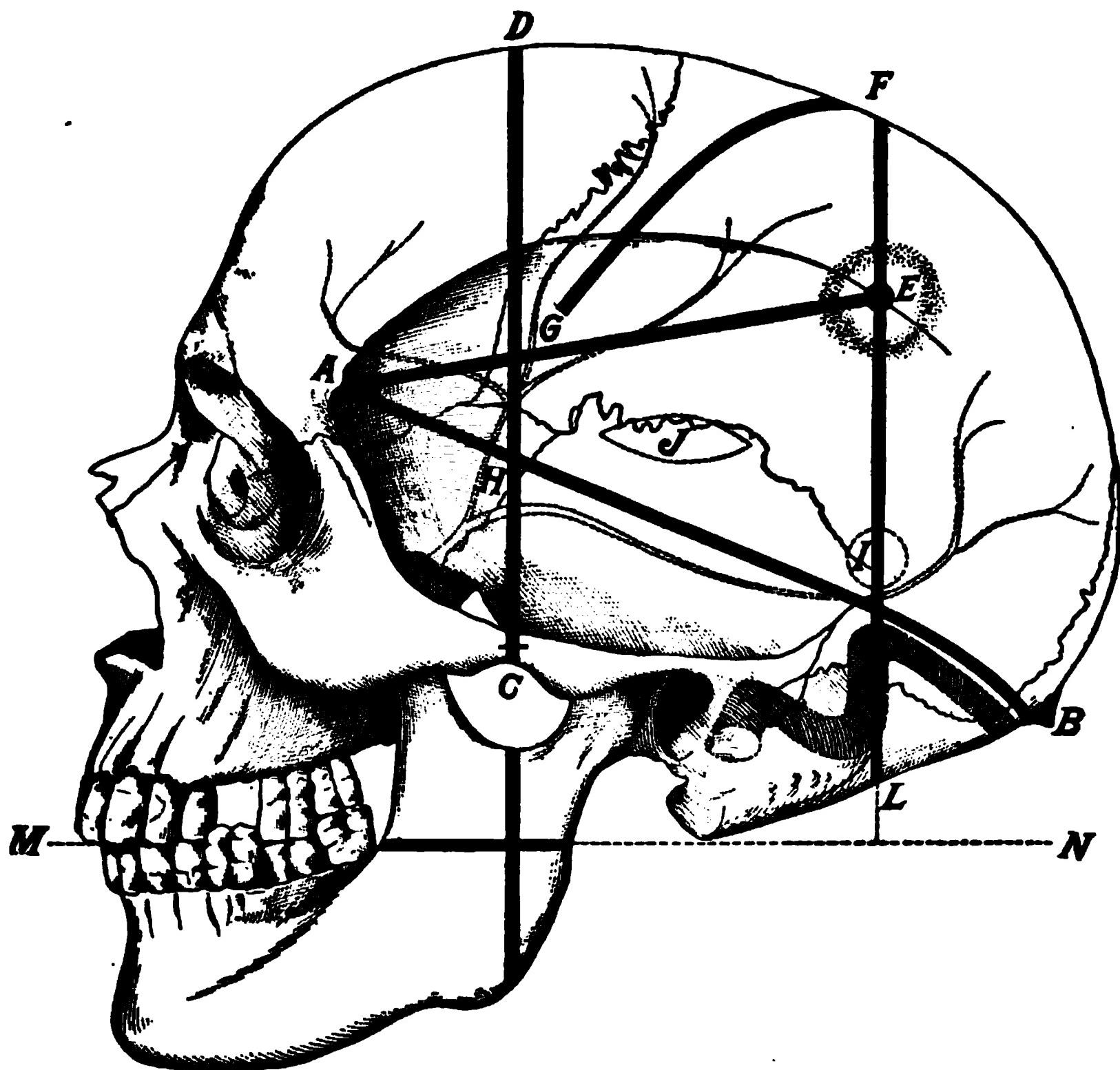


FIG. 1.—TOPOGRAPHY OF THE BRAIN. (LANGDON.)
Cincinnati Medical Journal.

the Sylvian fissure; (3) the third frontal convolution (speech area) and part of tongue and face areas. (See Fig. 2). *H*. Intersection of *A-B* and *C-D*. A similar trephine-hole here will expose (1) the bifurcation of the middle meningeal trunk; (2) the smell and taste areas in the tip of temporal lobe. *I*. Situation of trephine-opening to tap abscess of temporal lobe and avoid petrous process, tentorium cerebelli, and lateral sinus. *J*. Level of first temporo-sphenoidal convolution (hearing area), two inches vertically above

centre of external auditory meatus. *K*. Lateral sinus in shaded outline. *L*. Posterior border of base of mastoid process crossed by continuation of parietal vertical line.

The Lines.—*A-B*. Fronto-occipital line, defining the lower boundary of cerebrum, excepting a portion of temporal lobe, which lies below. (See Fig. 2.) *A-E*. Fronto-parietal line, its

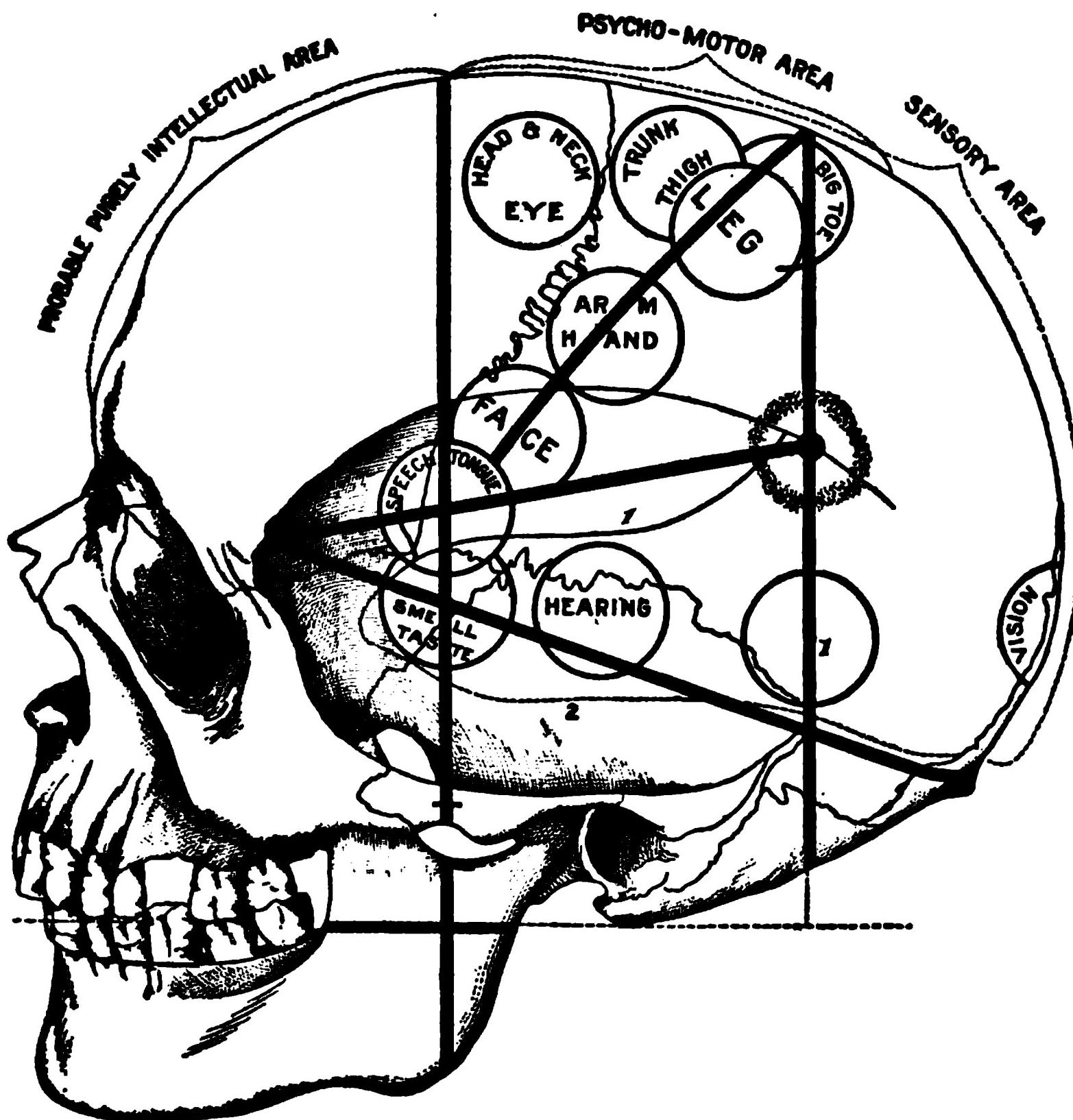


FIG. 2.—TOPOGRAPHY OF THE BRAIN. (LANGDON.)
Cincinnati Medical Journal.

posterior two-thirds nearly parallel with limb of Sylvian fissure, which lies less than half an inch below. (See Fig. 2.) *C-D*. Zygomatic vertical line, from greatest convexity of zygoma, vertically upward to median line. *E-F*. Parietal vertical line, from greatest convexity of parietal eminence to vertex, partly hidden by perspective in this figure; for its full length see Fig. 2, *E-L*, same line carried to posterior border of mastoid base and intersecting the "base-line" of Ranney at a right angle. *F-G*. Rolandic

line, guide to situation of fissure of Rolando (also partly hidden and curved by perspective; see Fig. 2 for its full length). *M-N.* "Base-line" of Ranney, useful as a check to secure accuracy of vertical lines. This line should correspond with the cusps of the upper incisors and the tip of the mastoid process.

Fig. 2 gives an oblique profile view of skull (half natural size), with vertex tilted toward observer, so as to show surgical lines and areas to vertex, from a photograph of same skull and lines as Fig. 1. The tilting, by raising the incisor teeth, apparently throws the "base-line" below them. 1. Fissure of Sylvius—horizontal line. 2. Lower limit of temporo-sphenoidal lobe in dotted outline. *I.* Same as *I* in Fig. 1. Half-inch circles mark situations of trephine-openings to expose localized functional areas. As all proportions in both figures are accurately reduced to one-half actual size, all that is necessary, in comparing with the living head, is to double all distances or measurements desired.

A *résumé* of a new method of determining crano-encephalic topography was presented by d'Antona.¹⁰⁸⁵ ⁹⁶ The two most-fixed osseous points at the base of the skull are the lower orbital margin and the auditory canal. A line drawn from the former to the centre of the latter is the most rational and fixed base for determining the topography. A vertical line is drawn from the centre of the auditory canal, at right angles to the base-line, forming a true bi-auricular line. In order that the two orbito-auricular lines may form a perfect right angle, it is best to employ two threads and a carpenter's square, or a visiting-card which has been accurately squared beforehand. The fissure of Rolando crosses this vertical line at an angle of from 20 degrees to 25 degrees. The lower temporal fissure is on this vertical line, three centimetres from the centre of the auditory canal; the upper (parallel) temporal fissure, between the second temporal convolutions below and the first above, four and a half centimetres distant. The fissure of Sylvius is on this line, six centimetres from its starting-point, somewhat in front of the point where the post-Rolandic sulcus inserts into the Sylvian. From this point a transverse line is drawn at a right angle to the vertical bi-auricular and parallel with the orbito-auricular line. The lower angle of the fissure of Rolando is crossed by this second horizontal line twelve millimetres from its starting-point; thirty-five millimetres farther on the same line

crosses the posterior foot of the third frontal convolution. The upper extremity of the fissure of Rolando is twelve millimetres behind the vertical bi-auricular line, one centimetre before this line crosses the sagittal suture. The parieto-occipital fissure is five centimetres behind the upper point of the fissure of Rolando and parallel to the sagittal suture. For the direction of the fissure of Sylvius it is necessary to draw a line intersecting the bi-auricular six centimetres above the auditory canal, and proceeding obliquely to the vertical (angle of 75 degrees) four centimetres backward and upward and fifty centimetres forward and downward. The upper branch of the Sylvian fissure separates from the other arm

TEMPORARY RESECTION OF THE SKULL. (CHIPAULT.)
Gazette des hôpitaux.

twenty millimetres from its extreme anterior point, and runs in a line 30 degrees from the vertical.

NOVEL SURGICAL PROCEDURES.

Chipault,¹⁰⁰ describes a new method of temporary resection of the skull, which he calls bilinear craniectomy. (See illustration.) The proceeding is as follows:—

The head having been fixed on a sand-bag, the soft parts are cut through to the periosteum, so as to form three sides of a trapezium. The fourth side, which forms the pedicle, should be the smallest. The soft parts are then retracted, the periosteum incised and detached along the edges of the incision. The bone is opened by a furrow varying in length according to the length

of the sides of the flap. The corners of the bone incision are removed with a trephine and the incision completed by means of a chisel or cutting forceps, according to the thickness of the skull. As the part of the incision made with the chisel starts from the perforations made by the trephine, the chisel may be made to attack the whole thickness of the skull at each stroke; two or three mallet-strokes are generally sufficient to complete the section. The bony pedicle of the flap is also cut through subcutaneously. The whole flap can then be turned back. At the close of the operation the bone is replaced and the periosteum and skin carefully sutured. The advantages of the operation are: that the opening in the skull can be made as large as necessary, or, if not large enough, can be readily enlarged; it causes less traumatism than Wagner's method, and by the two parallel furrows allows the re-implantation of the bony flap without the danger of compression.

Mossi¹⁴ states that, in cats and rabbits, heteroplastic grafts are successful when the transplanted buttons are taken from an inferior animal. The graft should be taken from species as nearly related as possible, though in some cases transplantations from remote species have been successful. The animal supplying the graft must be young. It is advantageous to select a graft in which the point of ossification is still present.

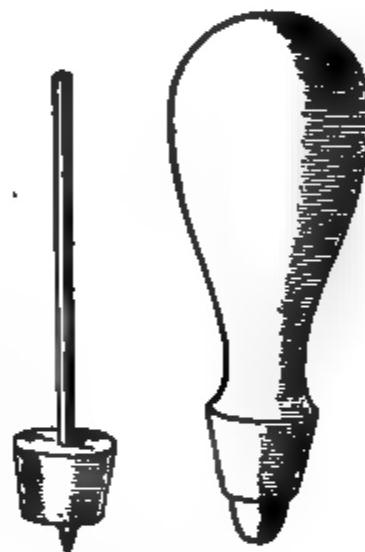
Knox²¹³ presented to the Glasgow Pathological and Clinical Society a set of circular saws for which he used a dental engine as motor. The saws varied in diameter from five-eighths to one and one-eighth inches.

Sneve,⁹ in a patient 48 years of age, having a denuded space over the left parietal bone, two and one-half inches long by two inches wide, which had resisted many efforts to cover the bone, perforated the external table, making thirteen perforations, one-eighth of an inch deep, at equal distances apart. The depth was determined by a lessened resistance to the instrument. A small drill was procured one-sixteenth of an inch in diameter, and a wooden stopper placed over the end, leaving one-eighth of an inch of the drill-point projecting. The other end was fastened in an ordinary awl-handle. The drilling did not seem to cause any pain. A very small amount of blood-stained serum moistened the apertures. On the twentieth day small red points were visible in the openings, growing rapidly, spreading out until the entire bare sur-

face was covered by healthy-looking granulations; these grew upward to the level of the surrounding scalp, and became covered in time by an unhealthy-looking cuticle, which ulcerated in spots repeatedly; to remedy this, small skin-grafts taken from the shoulder, after Reverdin's method, were applied, and the whole cicatrized nicely.

Two years after, the scalp at this point presented one or two small spots which alternately ulcerated and healed, but, on the whole, the operation was a success, and the appearance was vastly superior to that of the denuded white bone.

There are two dangers from the operation: (1) septic absorption with its sequelæ, rendered easy by the structure of the veins,



PERFORATION OF DENUDDED PARTS OF SKULL. (SNEVE.)
Medical News.

and (2) perforation of the inner table in very thin skulls. Eiselberg,²⁴ reports the case of a girl, aged 15, in whom a large sequestrum had been removed from the squamous portion of the temporal bone, owing to caries necrotica. A month after the operation a celluloid plate was placed in the defect and the osseous cavity closed. Eiselberg's experience has taught him that in cases of this kind the plate should be removed after three months, an accumulation of pus being likely to occur underneath.

Tietze¹⁸ reports two cases operated upon by Mikulicz, in which skull defects were closed by means of pedicled skin-bone-flaps (König's method). Both were successful. In the second case, the bone rested directly on the pia mater. Park,²⁵ states that the most progressive surgeons are coming to the conclusion that,

even in cases of mild haemorrhage, it is best to trephine, in order to avoid the risks of a small clot being retained in the cranial cavity. From experiments upon the brains of dogs, Adamkiewicz,⁵ concludes that, for the disinfection of wounds of the cerebrum, solutions of carbolic acid and sublimate, even in weakest solutions, are to be entirely prohibited, as in proportions of 1 to 200 and 1 to 10,000, respectively, they are capable of producing very serious symptoms, 1 gramme ($15\frac{1}{2}$ grains) of either, injected into the brain-substance hypodermatically, producing alarming symptoms and death in dogs. In contradistinction to this, the 3-percent. solution of boric acid can be used without danger, and the author believes that special rules must be followed in the antiseptic treatment of brain wounds.

TUMORS.

McBurney and Starr⁵ report three new cases of tumor and review the literature exhaustively. Combining the results of the cerebral operations with those of the cerebellar operations, they found that the total number of patients operated upon for intracranial tumors has been eighty-seven, and that forty of these, or 46 per cent., have proved successful, the patients recovering. Experience will, doubtless, result in a more-favorable outcome as time goes on, and neither neurologists nor surgeons should be discouraged in their attempts to relieve a formerly fatal disease.

Gray⁴⁷ Autumn, Winter, '98 reports a case of tumor of the centrum ovale, causing paralysis of motion and muscular sense, in which an operation was performed with fatal result. There were no adhesions of the dura. Careful sections of the brain from cortex to base, vertically, revealed no tumor, but on examination by finger and scalpel a neoplasm about the size of a hickory-nut, and so soft in consistency that it was not distinguishable by palpation from the surrounding cerebral substance, was made out. It lay in the ascending parietal convolution, near the posterior border, and was situated about one-quarter of an inch beneath the surface of the convolution, at about the junction of the upper and middle third. Upon section it was found that the tumor had been penetrated by one of the exploratory needles. A microscopical examination showed that it was a round-celled sarcoma of the melanotic variety.

Booth and Curtis²⁰ report the case of a man, 24 years of age, who had had hip-joint trouble since childhood, but otherwise had been in good health until about eighteen months before applying for treatment, when he developed epilepsy, falling down suddenly, becoming unconscious, and having general convulsive movements of both the upper and lower extremities; headache, chiefly frontal, severe at times; change in character, tendency to lethargy and depression, loss of memory, diminution of the sense of smell, failure of vision, an advanced optic neuritis, and finally the appearance of a swelling in the left temple. On admission to the hospital the tumor in the temporal region was about one and one-half inches in diameter; it was tense, smooth on its surface, and a bony edge could be felt around the upper part of its base. The skin was normal, but pressure was slightly painful over the tumor and its immediate neighborhood. At the operation the pericranium was found somewhat adherent to the surface of the tumor, but could be separated by blunt dissection. The tumor was exposed and found to be covered by a tough, soft, red membrane, containing a cheesy material, which was removed. The dura was separated from the roof of the orbit, where the tumor was adherent and had caused absorption of the bone. The bone was cut away until the limits of the tumor could be felt on all sides before the dura was incised. The dura was now opened and the tumor enucleated with the finger. There was no shock following the operation; the patient slept well during the night, and the next day talked as well as before the operation. Although the operation lasted over two hours, there was hardly any shock, and very little blood was lost. The healing

FIG. 1.—EXTERNAL PROJECTION OF CEREBRAL TUMOR. (BOOTH AND CURTIS.)
A, tumor.
Annals of Surgery.

of the wound was delayed by a tubercular infection. The patient was entirely blind, owing to the high degree of neuritis present before the operation. The tumor is here shown.

Nicolaysen ^{1889, 90} extirpated an endothelial sarcoma, the size of a child's fist, situated in the right temporal region. The tumor was solid, elastic, immovable, pulsating, and projected like a fungus from a depression of the skull, and had evidently started from the diploë. There was a depression made by the tumor in the surface of the cerebrum, of three and a half centimetres deep and four and a half centimetres wide. The whole mass, together with one centimetre of the surrounding bone, was removed, and the

Figs. 2 AND 8.—THE TUMOR, NATURAL SIZE. (BOOTH AND CURTIS.)
Annals of Surgery.

patient appears to be cured. Very few symptoms of cerebral compression were present, notwithstanding the great depression in the frontal and temporal convolutions.

Postempski ^{1884, 88} operated upon a case of endocranial cyst in a youth of 16 years. Nearly the whole of the right temporal region was occupied by this cyst. When 3 years of age the patient had received an injury in the left parietal region, but had apparently completely recovered. Soon after the child had paresis of the left lower and subsequently of the corresponding upper extremity and of one side of the face. The upper extremity became atrophied. Repeated convulsions appeared four months before operation. The sac-like cyst was found to be eighteen centimetres

long and nine centimetres deep. It was drained and tamponed, and the wound soon healed, but convulsions returned.

Steiglitz¹ reported a case of cystic tumor of the brain, operated upon with success by Gerster, in a woman 25 years of age. An area on the dura, of about the size of half a dollar, showed a diffuse, yellowish tinge, different from the color of the adjacent dura. The application of the poles of a small faradic battery to the unopened membrane promptly determined the centre for the movements of the hands and fingers, and the point corresponded with the discolored area. When the dura was opened, the cortex of the brain showed no apparent change. A vertical incision into its substance was followed by a gush of yellow, serous fluid, none of which, unfortunately, was saved. Perhaps an ounce of fluid escaped. The walls of the cyst were found to be perfectly smooth. A small layer of gray matter was removed from the centre exposed, to prevent disturbances which might develop from possible secondary sclerotic changes. On the day following the patient had lost all power in her right thumb and forefinger, and could move her other fingers and the entire right arm but very slightly. This gradually improved. She had slight convulsive twitchings in her right hand, right arm, and face. About a month later and a week after this attack, she had more violent twitchings. The scalp wound was opened and adhesions were found between the flap of skin and the dura. Probing revealed no recurrence of fluid in the cyst. The adhesions were separated and a flexible gold plate was inserted. Two days after there was slight twitching in the three ulnar fingers; the patient could move her fingers, hand, and arm quite extensively. Upon examination five months later, it was found that she had lost the sensation of position in the fourth and fifth fingers of the right hand; she could not tell whether they were flexed or extended. The strength of her hand and arm was greatly increased. The patient had been kept on doses of from 15 to 30 grains (1 to 2 grammes) of potassium bromide daily since the operation.

It was thought probable that there had been a glioma at the bottom of this patient's trouble. In that case there was reason to fear a further growth of the tumor.

All through the operation the patient's right side was thrown into spasms when the tumor was pulled, but after its removal there

was no paralysis whatever. The wound was sutured, and healed by first intention. She was discharged with no paralysis or defect of speech, and admitted that the tumor was congenital.

Llobet⁹¹,_{Nov., 1888; Dec. 10, 1888}² reports a case of extirpation of an hydatid cyst of the brain by temporary and extensive resection of the cranial vault, in a boy aged 13. The patient made a fair recovery, and six months after the date of the operation there had been no return of any of the symptoms, with the exception of the impairment of sight and of memory.

Pauly²¹¹ published a case of Jacksonian epilepsy operated upon by Jaboulay. This patient had convulsions originating and always present in the left upper extremity, but sometimes attacking the face and the lower limb. A cystic tumor was found posterior to the fissure of Rolando and dissected out. The patient died of broncho-pneumonia on the fourth day. At the autopsy there were found, on the opposite side from the operation, signs of meningitis. On the right there were only the traces of the removed cyst.

Cleghorn⁵⁵⁷ also reports a case operated upon four times. Each time a cavity, filled with softened brain-tissue, extending two inches toward the centre of the brain, nearly to the falx, and for two inches from there toward the right border, where it was not more than one inch in depth, was scraped out and drained. Invariably there was a temporary improvement, followed by recurrence of all the symptoms. The case was reported too soon after the final operation for any deductions to be drawn in reference to the permanency of the improvement.

A second case was a boy of 9 years, who had Jacksonian epilepsy. The skull was opened, directly over the fissure of Rolando, one and a half inches from the median line. A yellow patch was seen under one of the four discs of bone, and a cavity filled with softened brain-tissue, similar to the previous case, was found and treated exactly as in the former instance. Six months later this patient was much improved, although there is still a little weakness on the left side.

Mayo⁹⁶, excised an hydrancephalocele in a child 1½ years of age, with recovery. The tumor was spherical, pulsatile in character, the size of a small orange, projecting centrally from the occipital region. The neck of the sac was ligated with heavy

catgut, cut away, and the tissues around the stump sutured over it. The child was discharged well in two weeks.

Lea², reports two cases of meningocele treated by excision by Wright. In the first, a child 6 weeks old, there was a swelling in the occipital region the size of a large walnut. It was partially reducible, and pressure upon it caused the child to start and turn its eyes inward. At the operation a catgut ligature was passed around the sac close to the opening in the skull, the tumor was cut away, and the wound closed. The child improved very much in its general condition, but at 8 months of age hydrocephalus became evident. The head gradually increased in size, and the child died when 11 months old. The tumor was a meningocele, and its contents clear, serous fluid.

The second child was 8 months old and had a large, tense swelling the size of a hen's egg, also in the occipital region, which had rapidly increased in size since birth. There was left internal strabismus, but no other evidence of paralysis. This tumor was cut off close to the skull-opening. The stump showed a broad section of cerebellum. The wound was closed and healed without complication, the child leaving the hospital three weeks after the operation. Hydrocephalus developed in this case also, but the child was alive at the end of seventeen months.

Charon⁸⁶⁸ also excised a meningocele, the size of a newborn child's head, from the region of the posterior fontanelle. The sac was tied with catgut, and the child recovered from the operation, but died later of an attack of eclampsia.

Delagénière², removed a sarcomatous tumor of the dura mater which required an extensive dissection of the diseased membrane. Five months later the patient was in perfect health.

Dugan²²⁴ reports the case of a woman, 50 years of age, who had double choked disc, partial paralysis of the right leg, twitching of the right side of the face, and partial anæsthesia of the right arm. Diagnosis of tumor of the left side about the upper part of the fissure of Rolando was made. At the operation the evidences of intra-cranial pressure were very marked, but exploration with an hypodermatic needle revealed neither cyst nor tumor. A grooved director was then passed into the left ventricle and about three ounces (90 grammes) of fluid evacuated, entirely relieving the cerebral tension.

Diller,⁵ gives the history of a man 33 years old who fell, striking the back of his head. He was not rendered unconscious and continued to work for some time, but complained of giddiness; muscular lassitude; diffuse headache, occasionally localized and severe; drowsiness, left hemiparesis, cerebellar titubation or ataxia of a certain sort, some failure of vision; difficulty in walking, which is most likely more owing to inability to co-ordinate than to dimness of vision or left-sided muscular weakness; marked dysphagia and aphonia; advanced optic neuritis. A small, bony exostosis was made out over the superior parietal convolution. The skull was opened over the exostosis; the lateral ventricle was tapped, evacuating at least two ounces (60 grammes) of fluid, but no tumor was discovered. The next morning the paresis of the left side had increased, and the patient had three or four general convulsions. He died of œdema of the lungs thirty-six hours after the operation, and a tumor was found, about the size of a walnut, situated on the left side of the pons, which proved to be a sarcoma.

Parry²¹³ removed a tumor from the cerebellum of an hydrocephalic child. The patient was quite intelligent, but totally blind. The tumor was exposed and some of it removed with a Volkmann spoon, when the operation had to be discontinued because of the patient's condition. He did not regain consciousness, and died some hours later. Several tubercular glands were found at the autopsy, about the upper part of the anterior border of the left lung. A tumor-mass was also situated in the posterior portion (less than half of the antero-posterior measurement) of the left hemisphere of the cerebellum, and apparently occupied all the breadth of that portion of the lobe. Microscopical examination established its tubercular nature. Giant-cells, with multiple nuclei, and caseous necrosis of the tissue involved in the morbid process, were observed. (See illustrations.)

Clarke and Steven²¹³ presented a tumor of the cerebellum from a child with extreme hydrocephalus. He was 4 years old; had been healthy till 2 years of age, but, eight months before coming to the hospital, had become hydrocephalic. The symptoms were as follow: Head large, flat at the top; anterior fontanelle of large size, veins of the head much distended, and face pale. Child could not sit up unaided, but could move the limbs

feeble. Could not understand what was said to him, but took food well and was free from pain. Passed urine and faeces in bed. His intelligence was at a very low ebb. The superficial veins of the abdomen were enlarged, and the abdomen itself was turgid; his hands were flexed and forearms pronated at all times; he had very little power of grasping. Tapping relieved the hydrocephalus for a time, but death soon followed. A large tumor, the size of a hen's egg, was found in the left lobe of the cerebellum.

FIG. 1.

FIG. 2.

TUMOR OF CEREBELLUM. (PARRY.)

Fig. 1, median section of cerebellum, tumor seen on surface of left hemisphere; Fig. 2, section one-half inch from middle line; Fig. 3, section one inch from middle line.

Glasgow Medical Journal.

FIG. 3.

The tumor was a scrofulous tubercle, and its pressure, seriously interfering with the free return of blood from the lateral ventricles through the veins of Galen and the straight sinus, caused the hydrocephalus.

Park,⁹ in a case in which Putnam and he were unable to decide positively whether the tumor was cortical or located along the deep paths of conduction, made an exploratory operation, which proved of no avail, and ended fatally within forty-eight

hours. In another case in which both observers were convinced of the presence of a tumor, but regarded it as inaccessible, operation was undertaken, simply for the relief of tension. A large area of bone was removed and the relief from the distressing headache continued up to the time of the patient's death, from the natural consequences of the disease.

Von Bramann¹³ gives a complete report of the two cases mentioned in last year's ANNUAL (vol. iii, A-4). In both cases the tumors were unusually large, and required a very extensive resection of the skull. The opening was made according to Wagner's method, and a cyst, containing about 50 grammes ($1\frac{1}{2}$ ounces) of a clear, greenish-yellow fluid, which occupied the third convolution and the upper portion of the central sulcus, was found in the first case. Within six weeks the symptoms were as severe as before the operation, and solid tumor-masses protruded from the drainage-opening. Two operations were performed in rapid succession. The third was very severe, and was aggravated by the fact that a process ran from the tumor downward for about four centimetres, and required the greatest care in its extirpation. The weight of the tumor was 90 grammes (3 ounces). There was no recurrence for eight months, the time of the report.

The second case was a tumor of the frontal lobe, extending to the motor region. This tumor weighed 280 grammes (9 ounces). Considerable improvement followed its extirpation, and there had been no recurrence six months after the operation.

Corresponding Editor Neve, of India,⁶⁷⁸ reports a case of gumma of the dura mater, which communicated, by two perforations of the anterior superior portion of the left parietal bone, with a discharging sinus, and which was treated by trephining and by paring away the new growth. Temporary relief from the fits and paralytic symptoms resulted, but a relapse followed a few weeks later; a second trephining resulted in hernia cerebri and death.

Diller and Buchanan⁴⁵¹ report a case of subcortical cyst of the lower part of the left ascending parietal convolution. There was paresis of the right arm and hand, and palsy of the face. Considerable impairment of power in right leg. Sensation normal. He was frequently at a loss for a word; could think of all words he wished to express, but could not always utter them. No word-deafness, nor soul-blindness. Mental condition good. Headache,

vomiting, vertigo, and convulsions in the paretic parts. The eye-grounds aroused suspicion, but no positive evidence of choked disc was present. Aphasia was the first symptom, and the course of the disease was gradual. Operation was followed by marked improvement in the aphasia and paresis of leg and arm. Convulsions persist.

Wolfner, of St. Louis,³⁶⁴ states that it is difficult at the present time to obtain reliable statistics showing the frequency of choked disc in brain-tumor, but, apparently, it is the most constant symptom next to headache and vomiting, being present in about 66 per cent. in the recently-recorded cases.

Zeller, of Stuttgart,¹⁸⁸ reported a case of sarcoma of the frontal bone, in which the diseased area was chiseled away and the dura found involved for some distance under the sound bone. Sufficient bone was removed to expose the whole of the involved dura, during which the frontal sinus was opened. It was occupied by a projection of the tumor-mass. The brain also was involved, and a piece about the size of a walnut was excised. The patient was able to return to work six weeks after the accident.

A case of fatal traumatic sarcoma of the skull, in a boy 5 years of age, who had been struck on the left temple by half a brick, was reported by Hewetson.⁶ The swelling, at first about the size and shape of a cricket-ball, and situated above the left zygoma, grew rapidly, until the measurements attained were: longest vertical surface, fourteen and one-half inches; longest antero-posterior surface, sixteen and one-half inches; circumference around base, twenty-five inches.

Mayo¹⁰⁵ operated on a child, 18 months of age, for the relief of a congenital, pulsating, occipital hydrencephalocele the size of a glove-orange. The tumor was found to communicate with the right ventricle, and was treated by a clean excision, without drainage. The child made an uneventful recovery. This case is an illustration of the modern treatment of this class of patients, who have heretofore been considered almost absolutely hopeless.

Lucas²² operated on a boy, aged 5 years, who had unilateral convulsions after a fall on the head. There was an enlargement of the skull on the right side, in the temporal region. A button of bone was removed at this situation, but, nothing abnormal being found, the piece of bone was replaced. The wound, a few

days later, was found suppurating, was laid open, and healed by granulation. Ten days later exploration was made in the Rolandic region, but nothing abnormal was found. A few days after this symptoms of meningitis developed, and a hernia cerebri appeared at the site of the second operation. At the autopsy there was found a diffuse suppurative meningitis and a large opening into the lateral ventricle, which was made a day before the patient died. The fourth ventricle was distended and the left lobe of the cerebellum was squeezed into a small lump, while the right lobe was enlarged and contained a large cyst, about the size of a bantam's egg.

Hydrocephalus.—Wyss²¹⁴,¹¹² favors puncture of the skull in the treatment of hydrocephalus. He gives the advantages and disadvantages, as follow: The advantages are: 1. Cessation of convulsions. 2. Quieting of the restless, screaming patient. 3. Good influence on bodily development. 4. Improvement or saving of the psychic functions. 5. Restoration of sight when lost. The disadvantages are: 1. Formation of an haematoma; very rare, and usually avoidable. 2. Infectious meningitis, avoidable by asepsis. 3. Meningitis through pressure; gangrene; occurs also without puncture, and is avoidable by drawing off small quantities at a time. 4. Collapse. Never occurs in dangerous degree under favorable conditions. The operation is indicated: 1. In acute meningitis with severe pressure-symptoms. 2. In later stages of non-tubercular meningitis. 3. Hydrocephalus of congenital syphilitic origin. 4. In enlargement of head following meningitis; here to be often repeated. 5. In loss of important functions, as sight, in hydrocephalus.

Von Ziemssen¹⁶⁹ confirmed Quincke's statements in regard to the comparative ease and safety of puncture and drainage of the spinal canal in hydrocephalus. In cases of high pressure, a small fountain of cerebro-spinal fluid flows from the cannula. The quantities of fluid drawn off vary between 30 and 90 cubic centimetres (1 to 3 ounces). Puncture never did any harm, in his experience. The pulse is at first arhythmic, but soon becomes steady again. It should be performed only under chloroform narcosis. He has operated in twenty-two cases forty-one times. The specific gravity of the fluid was 1007 to 1010, and it contained about $\frac{1}{2}$ per cent. of albumen. In one case the fluid was

mixed with blood, and apoplexies were found in the brain at the autopsy.

Lanphear⁷² reports a case of trephining for hydrocephalus in a girl 4 years of age. The trouble began at the fifth month. A disc of bone was removed over the parietal eminence, and the opening enlarged until it was five inches long and one and one-half inches wide. The skull was not more than one-thirty-second of an inch thick, though quite ivory-like.

It has been said that the communication between the ventricular and subarachnoid spaces is closed in hydrocephalus. Carson has shown the incorrectness of this statement in cases of tubercular meningitis; but Lowson² reports a case of hydrocephalus in which he proved this to be the fact. He removed two laminæ, and opened the membranes in the dorsal region, but very little fluid escaping. Some days later he chiseled out a piece of occipital bone so as to enlarge the foramen magnum backward. The dura was then opened, when a bag of membranes presented; this was opened slightly and a quantity of limpid fluid flowed out rapidly, in spite of measures to prevent its escape, and the child died suddenly.

Halley, of Kansas City,¹⁰² details the case of a girl, 10 years of age, who had been injured, when 9 or 10 months old, in the left side of the head, a little above and in front of the parietal eminence. A tumor developed which pulsated violently, the pulsations being synchronous with the heart. When compressed it produced a slight dizziness. The diagnosis of meningocele was made, and an incision made through the scalp, over the summit of the tumor. There was an abundant escape of cerebro-spinal fluid. A piece of bone one and three-fourths inches long projected down toward the brain at one end, and was loosely attached to the bony wall of the tumor by the other. This was removed and the wound carefully closed. During the next three weeks she lost great quantities of cerebro-spinal fluid, and lost strength rapidly until the leakage was controlled by the cicatrization of the wound.

Microcephalus.—Gray⁴⁵¹ thinks that, of all causes of idiocy, only the premature ossification of the sutures and fontanelles, recent traumatic injuries, and haemorrhages can possibly be benefited by a craniectomy, for porencephaly, meningitis, meningoencephalitis, and myxœdema are conditions that the surgeon's

knife cannot in any way affect. He refers to several cases in which, so far, the result has been good. Some time should be permitted to elapse before passing judgment on the result in any particular case, for it is natural that an infantile brain arrested in development from any cause, even when the cause is removed, should develop more slowly than a normal cerebrum.

Joos,²¹⁴ _{Nov. 11, July} operated on a boy, 4 years of age, a microcephalic idiot, unable to talk, and not even knowing his name, very restless, with incontinence of urine and faeces, very irritable, and with a prolapsus of the rectum. Linear craniectomy, under chloroform narcosis, was performed by Walder, the incision being made to the right of the sagittal suture, from the lambdoid suture to the anterior limit of the hair. There was slow but distinct improvement, but not in speech. Seven months later a second operation was undertaken, and a transverse linear excision of a portion of the skull was made on the left side of the head, a strip two to two and a half centimetres in width, running from two centimetres above the left ear up to the former longitudinal excision. The wound healed in a few days, and the child, now one and a quarter years after the first operation, is markedly improved. He pronounces words, calls correctly for objects with which he is familiar, plays with other children, but still continues to be very irritable.

Kurz,² _{Nov. 22, '92} reports the case of a microcephalic child of 13 months, in which, about three centimetres to the left of the middle line, a disc of bone was removed with a trephine, and then a strip of bone sixteen centimetres long and one centimetre wide was removed with bone-forceps. The dura mater was uninjured. Eight weeks after the convulsions still occurred, but were less violent in character, and came on at longer intervals; there were some attempts at laughing and weeping, which had not been present before the operation.

Barlow,²¹³ in the case of a microcephalic girl aged 2 years and 11 months, removed a portion of skull one-third of an inch in width, running from a point a little in front of the coronal suture to a point one inch above and one inch to the left of the external occipital protuberance. After the operation the temperature of the legs improved, and on one occasion choice was exercised in the matter of food. There was also some improvement in the mental condition, and she could walk without support, but with some

uncertainty. Hearing is more acute and she takes more notice of her surroundings. The bifrontal diameter increased three-eighths of an inch in four months. A second operation on the other side, and with a communication across the bony bridge, has since been performed.

Wyman³⁸⁹ reports the case of a female child, 2½ years of age, whose head measured in circumference sixteen inches from the external auditory meatus to the auditory meatus on the opposite side; directly over the top of the cranium was a distance of nine and a half inches, and from the glabella to the inion was a distance of eight and a half inches. The forehead was remarkably small compared with the size of the face, but the expression of the face lacked intelligence. The child was unable to perform any voluntary movements of locomotion, nor could she hold any article in her grasp. A strip of bone one-half inch wide was removed from the frontal eminence backward to the inion, completely opening the cranium. The pericranium was carefully drawn together over the dura mater, and the scalp was united by interrupted sutures. The little patient rallied promptly from the operation, and at the time of writing was progressing favorably.

Bourneville^{73, 15},_{Jan. 24, Sept.} considers that the surgical treatment of idiocy is based upon an hypothesis not confirmed by the pathological conditions. The premature synostosis of cranial sutures does not exist in the different forms of idiocy, and partial synostosis is met with only occasionally. The lesions causing idiocy are usually deep, extensive, varied, and but little likely to be modified by craniectomy.

The results obtained by operative intervention have been slight, doubtful, or negative. Grave accidents, paralysis, convulsions, etc., and even death may be the consequence. The medico-pedagogic treatment, based upon Seguin's method, and favored by the introduction of new methods, judiciously employed for the proper length of time, produced better results than operation.

Rie⁵⁷ presented a child, 13 months old, which had been operated on five months previously by Lannelongue's method for microcephalus. Improvement had been decided. Aakerman²,_{Aug. 10} operated upon a boy, 20 months old, the circumference of whose head was sixteen inches. The child had nystagmus, convergent strabismus, double optic atrophy, and epileptic attacks of short

duration, which occurred several times a day; he also had subsultus tendinum and exaggerated reflexes. An incision was made parallel to and four inches from the sagittal suture, extending through the bone. The child's condition improved. Ten months later the circumference of the head had increased four-fifths of an inch, and the left parietal region was more prominent than the right. The child could walk and move his limbs. The right side was then operated upon, but no further improvement was noted. The author concludes that (1) craniotomy is justifiable in cases in which the parents wish something to be done, and when the patient is not too delicate; the mortality is about 15 per cent. (2) Too large a mass of bone should not be removed, and the operation should be done on the opposite side if requisite; the periosteum should be removed along with the bone. (3) Favorable results follow when microcephaly is associated with epileptic attacks, subsultus tendinum, rigidity, or paresis.

Perry² operated on a case 3 years and 3 months old. She had had fits for a year, and the measurements of her head were, from ear to ear, across the top, 23.5 centimetres; circumference, 38.8 centimetres. Fontanelles had never been observed. A strip of bone was removed from the left parietal bone, a finger's breadth from the sagittal suture. This measured 7 centimetres by 2.2 centimetres. The case was reported two months after operation, and the patient has immensely improved, and, although she has occasional fits, they are milder and occur at longer intervals than before the operation. She can now walk and stand, and appears to be attempting to speak.

Dana, of New York,²⁴² reported the case of a child operated upon by Powell, in which there had been a very decided and striking increase in the child's intelligence; this became noticeable a few weeks after the operation. Measurements of the skull since the operation have not been particularly instructive. The great circumference of the head has increased only one-half centimetre; the naso-occipital circumference increased nearly two centimetres. From this it will be observed that the head has grown a little faster than is usual in children of that age. He also narrated three other cases under his observation, all of which had died from shock. Keen⁹ declines to operate for microcephalus in children over 7 years of age. Lanphear¹⁰² classes all idiocy under seven

heads : (1) congenital ; (2) microcephalic ; (3) eclampsic ; (4) epileptic ; (5) hydrocephalic ; (6) traumatic ; (7) inflammatory. He advocates operation in the first, second, fourth, and sixth, and thinks it justifiable (though not advisable) in the fifth ; he would not operate in either the eclampsic or inflammatory forms of the disease. In congenital idiocy he has operated twice, and is thus far much pleased with the results obtained ; and he believes that as much is to be expected in this variety of idiocy as in any other, the increased space given the brain by operation stimulating its growth and development. At the operation, great care must be taken not to lose much blood, and not to prolong manipulation beyond forty minutes.

Norbury²⁷⁸ advocates educational instead of operative methods in idiocy. He claims that the marked improvement noticed in the few cases that have survived the operation is due to training while under observation following the operation. Had such persistency been as marked in the training of the child before as after the operation, no doubt the result would have been the same.

Bauer, of St. Louis,²⁷⁹ operated in 1871 upon a man 28 years of age, with acquired microcephalus. When 11 years of age he had received an injury to the head, and was temporarily unconscious. Two years later he became totally blind, but recovered the sight in one eye. In four years he developed petit mal, having twenty seizures in twenty-four hours, when he entered the hospital. He was taciturn, talked to himself, had an uncertain gait, and was reduced in mental power without being a complete idiot. Bauer assumed that the injury had caused pericranitis and premature ossification of the cranial sutures, and he removed a large piece of bone. Five years after the operation the man had fully recovered his mental power.

ABSCESS.

Ransohoff, of Cincinnati,⁴²⁸ operated on a man, 52 years of age, who had been wounded with a coupling-pin eight or nine weeks before. He had become extremely indifferent and had only occasional lucid intervals. It was suspected that an abscess had formed in a latent zone of the frontal lobe, but it was impossible to definitely determine the location of the lesion. The left arm and forearm became paretic, followed by complete paralysis in the face and arm. The operation did not reveal the presence of the

abscess, but at the autopsy it was discovered in the frontal lobe, involving the anterior extremity of the corpus striatum. Covered by the orbital convolutions underneath, the abscess extended through the medullary substance of the lobe and into the corpus striatum, stopping short of its ventricular surface.

Walton,⁹⁹ ~~xxv.17, 20~~ reports a case of metastatic abscess of the brain following pneumonia. The skull was opened over the Rolandic fissure, and an abscess containing about an ounce (30 grammes) of pus and broken-down brain-tissue was found. On introduction of the finger a large cavity was felt, which was drained and the wound closed. The symptoms were not relieved, and death occurred the day after the operation. Although no autopsy was allowed, examination through the wound showed an abscess-cavity with another abscess, higher up and toward the median line from the wound, apparently situated near the ascending frontal convolution. The cavity was the diameter of a robin's egg, and the finger could just reach the end, which ran downward, inward, and backward. This is reported by the author to be the first successful localization and operation for metastatic abscess of the brain. He also reports a case of temporo-sphenoidal abscess following middle-ear disease of a boy aged 12, operated on with success, and one of symptoms of cerebellar abscess, in which the mastoid antrum and the tympanum were cleared out, the cerebellar and the temporo-sphenoidal lobes explored; no pus was found, but a discharge of pus occurred from the tympanum, with relief of the symptoms and the recovery of the patient. It was supposed to be a subdural abscess, with meningitis.

Picqué⁹⁸, says, in regard to intra-cranial abscesses of otitic origin, that there may be no symptoms other than pain and fever; even the mastoid inflammation may be absent. He advises to promptly open the mastoid cavities and enlarge the opening upward so as to open the cranial cavity in the neighborhood of the upper face of the petrous bone. This procedure, though hitherto regarded as exceptional, must be considered as preferable. Even in encephalic abscesses with clearly-defined psychomotor localization symptoms, this should be the first operative step before employing the trephine on the exact level of the abscess.

Ball,²² ~~July 5~~, reports an abscess in this same region, in which a three-fourth-inch trephine was applied directly above the external

auditory meatus; so that the lower margin was half an inch above the roof of the meatus, as taught by Birmingham. Brain, much congested, bulged into the wound. The lower surface of the temporo-sphenoidal lobe was raised from the petrous bone. There were no adhesions indicating continuity of disease. A sterilized exploring needle penetrated an abscess-cavity at a depth of about a quarter of an inch from the surface. Over one ounce (30 grammes) of pus was evacuated and a drainage-tube inserted; it penetrated a distance of two inches from the trephine-opening. The patient recovered rapidly. Eighteen months after the operation she was in perfect health.

Clark, of Glasgow,²¹³ showed a patient on whom he had successfully operated for abscess of the temporo-sphenoidal lobe, following ear disease. The fact that the veins of the scalp were much distended, and that there was marked dullness on percussion of the right side of the head, as compared with the other, aided in locating the position of the abscess. He advocated trephining as close to the upper root of the zygoma as possible. The advantages of this opening are that (1) it corresponds, as nearly as possible, to the middle of the temporo-sphenoidal lobe; (2) it is close to the tegmen tympani, and, if desired, an opening can be made through this into the cavity of the tympanum, and drainage effected from the base of the skull instead of from the side; (3) an extension of the posterior limb of the incision permits of the mastoid being dealt with at the same time; (4) the bone operated on contains no diploë, and thus the risk of septic absorption is made considerably less. H. E. Jones, of Liverpool,¹⁸⁷ publishes the tables shown on pages 26 and 27, on the differential diagnosis of cerebral abscess, and states that, until the so-called mastoid antrum, the attic of the tympanum, the anterior surface of the petrous bone, and (in the case of suspected cerebellar abscess) the salcus lateralis have been thoroughly explored for pus, it should not be assumed that a temporo-sphenoidal or cerebellar abscess exists, or at least no operation should be undertaken to relieve the two last conditions which does not in its preliminary part satisfactorily dispose of the others.

Prichard,⁶ reports a case presenting several points of special interest, in addition to its being another instance of successful operation for septic thrombosis of the lateral sinus. The long time

SYMPTOMS. DISEASE.	LOCAL SIGNS.	PAIN.	VOMITING.	RIGORS.	TEMPERATURE.
<i>Tympanic and deep-seated mastoid disease.</i>	Chronic otorrhœa; œdema and tenderness may be present or absent.	In ear. May be severe general headache.	At onset.	Onset.	High, with slight variations. May be pyæmic.
<i>Subdural abscess.</i>	There may be œdema and local tenderness over seat of abscess, i.e., above auricle or at posterior border of mastoid, or all local signs may be absent.	Generally intense.	At onset.	Onset.	High and fairly steady, if uncomplicated.
<i>Meningitis.</i>		Pain usually of great severity, and general.	Generally present, often early in the case.		High, with moderate oscillations, falling after a few days, then rising rapidly before death.
<i>Septic phlebitis and thrombosis of lateral sinus.</i>	Swelling and stiffness of neck. Sometimes hard cord felt along course of internal jugular vein. Tenderness at posterior border of mastoid and along int. jugular vein.	Pain in ear, mastoid, and neck.	At onset and repeated from day to day.	At onset and repeated several times.	Oscillations of several degrees every day. Sometimes 5° or 6° between morning and evening temperature.
<i>Pyæmia (general).</i>	Rarely occurs without septic thrombosis: if it does, no local signs.		Frequent.	Recurring.	Oscillations as in septic phlebitis.
<i>Simple abscess in brain.</i>	Usually none except otorrhœa and pain in ear. May be local tenderness on percussion over seat of abscess.	Pain duller and more localized than in the meningitis; may be quite away from seat of abscess. (Gull.)	Occasionally late in the course of the case.	Often there are no rigors throughout. Sometimes initial rigor.	Temperature 101°, 102°, or 103° for a day or two, then normal or subnormal.
<i>Temporo-sphenoidal lobe.</i>					
<i>Cerebellum.</i>	Occasional stiffness and pain in neck.		More constant than in T. S. abscess.		

PULSE AND RESPIRATION.	BOWELS.	MENTAL CONDITION.	GENERAL NERVOUS SYSTEM.	OPTIC NEURITIS.	LEADING SYMPTOMS, ETC.
Rapid.	Usually constipated.	Delirium not uncommon.		Several cases have been reported, probably due to slight meningitis.	Local pain; high temperature; otorrhoea; often œdema over mastoid.
Rapid.	Usually constipated.	Delirium coming on late unless there is meningitis.		Often present; probably depends on meningitis.	
Pulse rapid, small, and irregular.	Constipated until just before death.	Delirium early; coma in last stage.	One or more cranial nerves usually implicated, causing squint and contraction of pupil or dilatation.	Edmunds gives 5 cases, all of which had optic neuritis.	Splitting headache; vomiting; rapid, small pulse; temperature high and steady, then falling below normal; delirium, coma.
Rapid pulse; pulmonary complications almost always.	Diarrhoea.			Edmunds:— 4 cases. 1 without optic neuritis, 8 with optic neuritis.	Swelling, stiffness, and pain in neck; repeated vomiting and rigors; great daily variations of temperature; generally optic neuritis; chest complications.
	Diarrhoea.	Mind often clear till just before death.		Depends on accompanying conditions.	Sweating; rigors; oscillating temperature and diarrhoea.
Pulse slow, full, irregular, may be as slow as 42 per minute. Respiration slow.	Persistent constipation.	Slow cerebration; quiet delirium occasionally; drowsiness; semi-coma.	Occasionally paralysis of 8d nerve; aphasia frequently; pupils very variable; abdomen retracted.	Edmunds:— <i>Temp.-Sphen.</i> 7 cases. 3 without O. N. 4 with O. N. <i>Cerebellar.</i> 4 cases. 1 without O. N. 8 with O. N.	Low temperature; slow pulse; slow cerebration; wasting; constipation; occasionally aphasia; muddy pallor of skin.
			No aphasia; staggering gait.		

that the mastoid disease remained dormant (as indicated by the history, corroborated by the cheesy material removed), the sudden onset of the acute symptoms, and the absence of meningitis and cerebral disease made the case practically an uncomplicated one of extension of the septic process from the mastoid to the lateral sinus. The operation was followed by complete recovery, in spite of the advanced septic condition of the contents of the sinus and vein. The case further illustrated the importance of being prepared to extend the operation if no sufficient cause for the symptoms can be discovered on simply opening the antrum; and hence, before commencing the operation, it is of advantage to lay down a general plan of the course to be pursued. For instance, the antrum should first be opened; if there are no signs of tension, the mastoid cells should be opened; if the symptoms are still unaccounted for, the cranium over the lateral sinus should be opened and the sinus examined; if septic contents are found, the internal jugular vein should be tied, the sinus laid open, and an endeavor made to clear the vein by syringing through from the vein to the sinus, clearing the upper end of the sinus until it bleeds freely; if this cannot be done it may be necessary to dissect it away; if any extra-dural abscess be found, all bone separated from the dura mater by it should be removed, to prevent burrowing. If the dura mater bulges into the opening, and especially if symptoms of cerebral abscess exist, the cerebrum should be carefully searched for pus; or even, though with greater care, the cerebellum may be explored. Lastly, it should never be forgotten that, even if nothing is found to account for the grave symptoms, the operation itself, involving as it does removal of bone and considerable local depletion, will in a fair proportion of cases arrest the symptoms, the patient making a good recovery.

Lane and Pitt²² presented a patient to the Clinical Society of London, who had, when a boy aged 14, received a blow on the head which had rendered him temporarily unconscious, but, as far as he could recollect, did not produce any other trouble. He was about 39 years of age; a year before he observed a soft spot in the skull to the right of the middle line. Lane laid the swelling freely open, when he found that the floor of the cavity was formed by dura mater, and that it extended for some distance from the margin of the opening beneath the skull, over which part of the cavity the

bone was partially eroded. Some organized clot was found on the surface of the dura mater, especially about the limits of the cavity. He removed much of the thinned bone that covered in the cavity in order to allow the flaps of scalp to fall down upon and come into contact with the floor of the abscess, which lay an inch beneath the normal level of the skull. Later he proposed to fill in the area of skull which was absent by bone-grafts.

Cheatham²²⁴ _{Jan. 14} reports a successful case in which, although there were symptoms of cerebral abscess, following middle-ear disease, nothing was found at the operation. Hayward,²² _{May 10} Evans,² _{Oct. 15, '98} Baines,² _{May 18} Eyesmith,⁶ _{Dec. '98} and Harrison⁶ _{Oct. 1, '98} all report cases of cerebral abscess, operated upon unsuccessfully.

Lane, Macewen, Horsley, and Jones took part in a discussion on the symptoms and treatment of middle-ear disease, at the annual meeting of the British Medical Association.² _{Sept.} Lane reported ten cases of septic infection of the lateral sinus upon which he had operated. Macewen had always operated in what he called the supra-meatal triangle. This he considered a safety-zone. By operating in this location he was always successful in striking the antrum, and by keeping to the upper and external margin of this region the facial canal was avoided. Horsley's experience coincided with Macewen's. In case the facial nerve was exposed, twitching of the face would be observed when an instrument passed over it, and this should warn the operator of its proximity. In cases of complete destruction of the nerve by tubercular disease there was some possibility of restoring it by nerve-grafting. In case of plugging in the venous sinus, the jugular vein should be ligatured in the neck to prevent the clot coming loose, and causing embolism of the heart or lungs.

Lanz²¹⁴ _{Feb. 16} reports a case of cerebral abscess, secondary to otitis media, which was operated on by Kocher. The mastoid antrum contained a little pus; when the middle fossa of the brain was opened, the dura seemed normal everywhere excepting a small spot in the region of the upper temporal convolution; there was a very slight discoloration, where the dura was tense, pulsated, and was not thickened. Exploration with a needle at this point revealed pus one to two centimetres deep. The abscess was laid open and about 100 cubic centimetres (3½ ounces) of fetid pus and particles of gangrenous brain-tissue were evacuated. The patient

gradually recovered consciousness for several days, when he again developed symptoms of brain-abscess. The cavity was reopened and a glass drain inserted. Some days later a discharge of cerebro-spinal fluid indicated that the lateral ventricle had been opened, but this did not prove a serious complication. The same patient developed another abscess, which could not be diagnosed, and did not communicate with the former, and death occurred.

Anders,²¹ at a meeting of the St. Petersburg Society, said that anatomically the most direct method of opening the mastoid antrum, in children under 5 years of age, is to apply the trephine two to three millimetres below the spina supra-meatus, along the edge of the mastoid process to the external auditory meatus and two millimetres inside of this canal on the posterior wall. The chisel should run in upward, backward, and inward. He showed specimens of the petrous portions of the temporal bone which demonstrated that operative procedures behind the insertion of the auricle were impossible.

Brentano⁴¹, reported a case of otitis media with perforation on the tympanum and an escape of fetid pus. The patient finally became unconscious, and the mastoid process was opened, the mastoid cells being filled with pus. The cranial cavity was also opened and a large abscess discovered, with discoloration of the dura. The skull was removed until the dura became normal and the wound was tamponed and sutured, when all symptoms immediately disappeared. Fifteen days later pus again appeared and a new point of discolouration in the dura was laid bare by fresh trepanation. When this was opened, about a tablespoonful of fetid pus was evacuated, and the patient made an uninterrupted recovery. The abscess was in the lower temporal convolution.

Terrillon¹⁴, reported to the Paris Surgical Society a case of intra-cerebral abscess following an otitis media, which had resulted from a violent attack of influenza. The dura was opened about three centimetres above and in front of the external auditory canal. The first puncture with an aspirating needle, to a depth of five centimetres was negative, but when it was introduced posteriorly about 30 grammes (1 ounce) of greenish-yellow pus were obtained. Without withdrawing the needle, another button of bone, posterior to the first, was removed. After cutting away the bony bridge

between the two trephine-openings, the abscess was opened. The patient recovered from the cerebral symptoms, but the suppuration of the ear persisted. Ballance¹⁰⁷⁷ says that the very worst thing that can be done in any ear case, with grave symptoms, is to blister or poultice the mastoid region or even to put on leeches, since this may complicate the after-treatment. The only really desirable measure is to frequently irrigate the external auditory meatus with an antiseptic fluid and apply a boracic fomentation.

Scheier, of Berlin,²⁸⁶ reports a case of cerebral abscess following otitis media, which was operated on by Körte. On opening the mastoid cells a small orifice was discovered, communicating with the cavity of the cranium, through which fetid pus escaped. Puncture of the transverse sinus proved that it was normal, and the skin incisions were enlarged and sufficient bone removed to expose the abscess. The dura was of a dirty, greenish-gray color, and covered with a thick deposit. The opening of the bone, six centimetres behind the external auditory canal, included the junction of the parietal, occipital, and temporal bones, adjoining portion of the occipital and the mastoid angle of the parietal bone. The cavity was washed out with 10-per-cent. thymol solution, powdered with iodoform, and tamponed with iodoform gauze. Fifteen days later pus appeared in the upper border of the wound, and when this was opened a large quantity escaped. A finger's breadth above the external auditory canal, and perpendicular to the first wound, an incision six centimetres long, and running in the direction of the occipital protuberance, was made. Two centimetres more of bone were removed and a point reached where the dura was non-pulsatile. Puncture at this point revealed pus and a cerebral abscess, the size of a hen's egg, at the junction of two lines, the first running from the right frontal tuberosity to the occipital protuberance, and the second a finger's width behind the right mastoid process, and perpendicular to the first. The patient recovered.

Kretschmann, of Magdeburg,⁸⁴ reports two cases of otitic cerebral abscess: one in a patient suffering from acute suppuration of the middle ear, in whom, owing to the absence of symptoms, the abscess was only discovered at the post-mortem. The second was operated upon. The wall of the auditory meatus was freed from the bone; the whole tympanic cavity was found filled with decaying masses of cholesteatoma, which ran through the posterior

osseous wall into the mastoid process. This was laid open; and when it had been cleared of the cholesteatomatous *débris*, an opening the size of a lentil, through the roof into the cranial cavity, was found. The dura appeared healthy and no pus escaped. The cavity was therefore packed with iodoform gauze, but there was only a very short improvement in the symptoms. An incision was therefore made perpendicular to the former one, four centimetres long, and the roof of mastoid antrum, together with the lower part of the squamous portion of the temporal bone, was removed. The dura appeared healthy, but it was incised and a trocar passed upward, forward, and inward revealed the presence of pus. The cavity was cut down upon and about 150 cubic centimetres (4½ ounces) of thin, discolored, fetid liquid, mixed with brain *débris*, escaped. The abscess-cavity was tamponed and the patient was able, at the end of about four or five months, to return to work.

Bircher, of Aarau,³³⁶ reports a case of phlebitis of the transverse sinus. Two trephine-openings were made above the auditory canal and the middle temporal fossa opened.

D'Ambrosio³³⁷ reports the case of a young man who, fifteen months before applying for treatment, had received an injury in the left frontal region. A few days later the wound began to suppurate, he developed high temperature, and became unconscious. At the end of three months he was cured, with the exception of a narrow fistula, which secreted a few drops of pus. He remained well for nine months, when he began to have a constant trembling of the upper extremities, especially on the right side, which at times was so marked that he had some difficulty in grasping objects. A probe passed eight centimetres into the fistula. Upon trephining the membranes were found very tense, and, when opened, about a litre (quart) of pus escaped. An enormous cavity was present, and the cerebrum was evidently very much compressed. He was perfectly well at the end of forty-five days.

Park³³⁸ reports the case of an elderly woman, who had a nasal polypus removed, developing rather severe nasal symptoms, and at the end of about four weeks brain symptoms accompanied by unconsciousness. The unconsciousness prevented localization, but it was decided to explore the frontal lobe on the side from which the polypus had been removed. Upon the fourth or fifth attempt

with the aspirating needle pus was found directly back of the trephine-opening, at a depth of about three centimetres. The abscess-cavity was freely opened, and about twelve cubic centimetres (three and one-fourth drachms) of pus evacuated. The patient never recovered consciousness, but died the next day, when it was found that on the other side, in almost exactly the same locality, there was a similar collection of about an equal quantity of pus. This case emphasizes, clinically, the recently-demonstrated connection between the lympho-vascular system of the nasal region and the encephalon, and indicates a possible source of danger from operations within the nasal cavity.

Voss²¹,₁₈₉₁ reported the case of a patient, 21 years old, who, at 10 years of age, had an attack of scarlatina, with some aural symptoms. He developed severe cerebral symptoms, and fetid pus was discovered in the auditory meatus of each side. About one inch behind the left ear, a finger's breadth above the upper wall, there was an old scar, adherent to the bone and very tender to the touch. The sinus transversalis, the dura, and the external auditory meatus were found close together. Without meeting an antrum the tympanic cavity was reached, after removing the upper posterior wall of the meatus. An opening in the roof communicated with a small abscess, which was filled with creamy pus. The opening was enlarged, but, some days later, a re-accumulation of fluid, owing to defective drainage, necessitated the removal of more bone, and the cavity was again laid open. He developed an attack of erysipelas, which did not affect his general condition materially, and had a facial paralysis, which lasted two months.

INTRACRANIAL HÆMORRHAGE.

Elliott⁴⁵¹,₁₈₉₁ says that there is no reason why compression following laceration of one of the large sinuses should not be successfully diagnosed and treated by trephining, even where there is no external evidence of fracture of the skull. He reports two cases. In the first there was middle meningeal haemorrhage, due to extensive fracture of the right side of the skull, involving the base. The brain was found to be compressed more than an inch below its normal level, and did not return when the clot was removed. Consequently, this large space between the dura and the skull immediately refilled with blood. The haemorrhage continued to be serious until the

whole space was packed with gauze. On the second day he began to recover his intelligence and continued to improve. The wound healed rapidly and the patient made a complete recovery. The second case was a subarachnoid hæmorrhage in a compound depressed fracture of the skull. The depression was an inch wide and three-fourths of an inch deep. The depressed fragments were removed and the dura mater appeared uninjured, but it bulged into the wound and did not pulsate. Distinct fluctuation showed the presence of fluid beneath. The dura was incised and a quantity of liquid blood was found in the arachnoid space. Blood continued to pour out and was only controlled by packing gauze deep in between the convolutions of the brain. The patient made a prompt recovery. He had, during convalescence, paresis of movements of the upper lip, especially noticeable in talking, and the tongue protruded to the left side for several weeks. The injury was over the lower part of the fissure of Rolando.

Warren,⁹⁹ in discussing this paper, said that the point of election for trephining in cases of hæmorrhage is where the parietal bone joins the frontal and temporal bones. If no clot is found there, he advises to trephine farther back on a line parallel with the roof of the orbit, to see whether the hæmorrhage does not come from a branch of the artery. It is a point of great importance that the pressure caused by the hæmorrhage should not only be relieved, but that an opening into the cranial cavity should be made, to remove all the fluid which remains there, and which, if there is a fracture across the vault of the pharynx, may become subsequently infected, and give rise to septic meningitis.

Dennis,¹ in a paper on cerebral hæmorrhage not due to traumatism, stated incidentally that he had removed a clot from the lateral ventricle. The first symptom in these cases is the history of an ill-defined headache. The pain is not acute as a rule, but consists of a dull ache accompanied by a sense of pressure. The pain often suddenly increases in intensity, due frequently to a new escape of blood. The vertex seems to be the most common seat of the cephalgia. The second symptom is paralysis. The extent of paresis depends upon the situation and size of the clot, which may involve the different cranial nerves, may affect certain functions of the brain, or may involve the centres of movement for the extremities. The third symptom is contraction and immo-

bility of the pupils, followed by dilatation as soon as the compressing force of the clot or cyst is pronounced. The contraction of the pupil for some time before an attack of unconsciousness is of great diagnostic value. The fourth symptom is optic neuritis. This condition is present after the disease has existed for a length of time; consequently, when the haematoma has formed this condition invariably exists. The fifth symptom is coma. This is a most valuable symptom. The loss of consciousness is usually sudden, but its rapidity is influenced by the extent of the haemorrhage. This condition is often preceded by a state of mental apathy and somnolence. These symptoms are susceptible of a wide range, since they vary considerably in different stages of the disease.

Briddon, in the discussion, stated that several years ago he had operated upon a patient brought into the hospital in a condition of coma. On cutting down to the dura a large quantity of bloody fluid flowed out. There were also large granulations on the dura, resembling trachoma. The autopsy revealed pachymeningitis haemorrhagica interna. He had not before been familiar with the condition, and did not recognize it at the time. The pressure had not been localized, but general.

Riegner,⁶⁹ reports the case of a child who fell from the first-floor window of a house, striking upon its head. Over the left temple, about two fingers' breadth from the external auditory canal, there was a fissure in the skull about two centimetres wide and ascending to the sagittal line. Marked paresis of the right side supervened, followed by chronic convulsions of the right facial region and extremities, and complete loss of speech. On the sixth day trephining was performed over the fissure. The dura mater was uninjured, but it was tense, bluish, and pulseless. It was incised, when there was an abundant escape of partly fluid and partly coagulated blood, intermixed with cerebral débris. About one year and a half after, the skull-defect measured three and one-half by eight centimetres, and an osteoplastic operation was successfully undertaken to close the defect.

Collum,⁶ reports the case of a man, aged 37, who had received a compound compressed fracture of the skull, the centre of the wound being vertically over the pinna and four inches above Reid's base-line. An elongated piece had been driven bodily

inward by the blow. The wound was dressed antiseptically, but five hours later he vomited and gradually lost consciousness. His pulse fell to 72. Finally he developed stertor, paralysis of the left side, pulse 64, irregular pupils, and it was evident the patient had an extravasation of blood. Trephining was performed over the fracture, and a dark blood-clot was found between the dura and the skull. A large teacupful of clotted blood was removed. Two bleeding-points were controlled, and his recovery was complete.

Schaeffer⁸⁶⁶ _{Mar., June} reports a case of haemorrhage which occurred three years after injury of the skull. The first symptoms of clot were localized convulsions involving the arm and left half of the body. Later, unconsciousness occurred, followed by hemiplegia, hemi-anesthesia, an ataxic aphasia, with mental dullness. The skull was trephined over the arm-centre, where the scar of the original injury was located. He found a subdural haemorrhage, and evacuated about two tablespoonfuls of blood. There were evidences of leptomeningitis. Three weeks later the paralysis and meningitis, as well as the ataxic aphasia, were improved.

Paulin, of Lunéville,¹⁸⁴ _{Sept. 1} reported the case of a patient who had fallen and had symptoms of haemorrhage on the right side. The skull was opened in the temporal region, and a subdural haemorrhage found. This was removed by the curette and the cavity packed. The patient recovered.

Buchanan¹⁶¹ _{Feb.} operated on an old man who had fallen down-stairs and developed symptoms of haemorrhage. The skull was laid open over the middle meningeal artery, and a slightly-depressed fracture was found. About two handfuls of clotted blood were washed from between the dura and the skull, and a brisk haemorrhage, which was controlled by packing, occurred as soon as all the clot was removed. The symptoms gradually disappeared.

FRACTURES OF THE CRANIAL VAULT.

Lanphear¹⁹ _{Oct. 1, 1872} says that we should operate in every case of fracture with depression, even if there be no symptoms whatever. It is impossible to say that a fracture of the skull, however simple it may appear, will not be followed by meningeal haemorrhage, or later by epilepsy, insanity, etc. He reported three cases to demonstrate the strength of his opinion.

Phelps²⁰⁷⁴ presents an extensive study of injuries of the head. The number of cases included in this report was 124. Of fractures of the vertex observed by him, 31 in all, 21 recovered and 10 died, and 10 necropsies were performed. The following complications were observed: Lacerations and resulting haemorrhage, 5; lacerations and general contusion, 2; atrophy, 1; laceration, meningeal and general, 1; contusion, 1; general contusion and epidural haemorrhage, 1; total, 10. The majority of the cases were males in adult life.

The most practical comment to be made upon fractures of the skull is that in themselves they are absolutely unimportant. It is only by their complications, immediate or remote, that they involve danger to life. The complications of fracture are haemorrhages, thromboses, lacerations, contusions, and paralyses. Their derivatives are meningitis, abscess, and atrophy. All of these may be produced from injury of the brain without fracture, except epidural haemorrhage without fracture, which he has never seen at autopsies, nor had cause to suspect the existence of in recovering cases. Three of the cases reported had traumatic thrombosis of the sinuses unconnected with pressure or any inflammatory process within or without their walls, or with any dyscrasia.

Lacerations and contusions of the brain are unquestionably first in frequency and importance among all the injuries of the head. They play a part in all fatal cases, and dominate the symptoms in almost all cases of recovery. They do not occur, however, with equal frequency. While in 58 cases observed there were 48 with lacerations, 28 were cases of laceration without noticeable contusion and but 10 of contusion without laceration. The subsequent changes which these wounds undergo are not numerous. If of considerable size, death ensues in the majority of cases before sufficient time has elapsed to permit any change of importance. The end to be hoped for, as in any wound with loss of tissue, is cicatrization. If the patient survive, the process of reparation is evidently slow. In certain cases, in which old lacerations were discovered after death from more-recent injury, there was no contraction of the wounds and no inflammatory changes of importance had begun. The edges of the wounds were slightly rounded, and the coagula which they contained were softened and their color had become rusty or yellow.

In necropsic cases of recent laceration an interval of from a few moments to one day, or several, has probably elapsed. The appearances are practically the same, whatever the interval may have been. There was no tendency to meningeal or visceral inflammation in any cases observed, with the exception of the occasional formation of abscess from subcortical laceration.

Contusion may be regarded as occurring in three forms: general and limited, affecting the brain; and meningeal, involving the membranes. The limited form may be either cortical or subcortical. Any two or all three of these may co-exist in the same case. Limited contusion of the brain differs from laceration as a contusion elsewhere differs from a wound. There is no palpable solution of continuity in the brain-fibres, and, consequently, the haemorrhagic extravasation can only be minute in quantity and of punctate or miliary form. In reparation only absorption, not cicatrization, is required, and recovery should occur in the major and not, as in laceration, in the minor proportion of cases. It is, therefore, less frequently met with in post-mortem observations. As in cortical or subcortical laceration, either form of limited contusion occasionally results in abscess. In the subcortical forms it may be difficult or impossible to determine which one of the two is the responsible lesion.

The author's data seem to prove that suppurative inflammation of the brain-substance is the result of primary injury of the brain itself, and not secondary to meningeal inflammation extended from the point of fracture. Compound fracture, however, still sustains a relation to deep abscess. It is not dependent upon the extent of the attendant laceration or contusion, which is likely to be as great under other circumstances. It is more probably due to exposure, for, though uninjured, the dura and cortex may not be impervious to atmospheric influences. The explanation of this subcortical suppuration is, at all events, neither more nor less difficult than that of subcutaneous suppuration upon the surface of the body. The dogmatic assertion that traumatic abscess in the brain never occurs except when there has been a wound of the scalp or fracture of the skull is erroneous. The important fact in connection with cerebral abscess at the present day is that it occurs from direct brain-lesion independent of injuries of the scalp, skull, or meninges.

General contusion of the brain is more frequent than the limited form, but much less frequent than laceration. Meningeal contusion as a distinct complication occasions haemorrhage and inflammation. Its relation to general contusion of the brain is not closely defined. The two conditions occur together or separately, and the severity of one, when they are coincident, is not always proportionate to that of the other. Haemorrhage is a frequent occurrence, and the blood is ordinarily effused in a rather thin sheet over one or both hemispheres, but may present itself in patches scattered over any part of the brain. When the haemorrhage is more profuse and the clot thicker, it can probably be traced to its source in a cortical laceration. The co-existence of both forms of cortical haemorrhage is not infrequent. If the fact be fully recognized that cortical haemorrhages of traumatic origin, unconnected with cortical laceration and without fracture as well as with it, are the result of meningeal contusion, the subject will not require further comment.

Traumatic arachnitis, so far as these records show, does not result from direct injury transmitted through fracture of the skull, nor from an inflammatory process propagated from a cortical laceration. An examination of the fifty-eight post-mortem observations discloses only seven cases in which it was possibly present, and only five in which it was positively determined. Two of these occurred in connection with fractures at the base, and the remainder in simple injuries of the brain in which no fracture existed. One of the former was an acute arachnitis; the other six were characterized by a subarachnoid serous effusion. They all negative the theory of direct violence, or of an extension of a prior inflammatory process. Fractures by *contre-coup* are exceptional. Lacerations and contusions of the brain, on the contrary, are almost invariably produced, either wholly or in part, in this way.

In the minority of cases in which some encephalic lesion exists directly beneath the point at which violence has been inflicted, there has usually been further and more-serious damage done to the brain in some distant part. Either laceration or general contusion has been discovered in each case subjected to post-mortem examination. If the cases of gunshot laceration are excluded, and also those of general contusion in which a question might arise as to the kind of violence to which the lesions should

be ascribed, only five instances are recorded in which the violence inflicted was exclusively direct. It is almost safe therefore to assume, in any given case, that if a lesion of the brain exist, it has been produced by *contre-coup* at a distance from the seat of the direct injury. A careful examination of the cases cited shows this distant point to be almost always on the opposite side of the brain, and confirms all previous observations that it is likely to be at the base, in the middle or anterior lobe. The author believes that concussion and compression should be excluded from systems of classification and descriptive histories of cases, since post-mortem observations disclose in every instance gross lesions in one or more regions of the brain or its membranes, forming a material basis for the symptoms preceding death.

The symptoms of injuries of the head, excluding those which are casual and without diagnostic significance, are fairly numerous. Fracture at the base has two symptoms peculiar to itself, and fracture of the vertex has also two; the others are common to both forms of fracture and to purely encephalic injuries. Those peculiar to fracture at the base are serous discharges from the ears or the nose, and haemorrhages from the ears, nose, or mouth, and into the orbital, subconjunctival, or cervical subcutaneous tissue. The characteristic symptom of fracture of the vertex, aside from a possible local serous discharge, lies in its perception by sight or touch. The symptoms of encephalic injuries, as a class, whether they occur independently or as complications of fracture, are: superficial injuries; peculiarities of temperature, pulse, and respiration; unconsciousness; delirium; irritability; paralysis; muscular rigidity; convulsions; anaesthesia and hyperaesthesia; pupillary changes; and, in a late stage, dementia. Other symptoms, as cephalgia, vomiting, vertigo, incontinence of urine and faeces, are frequent, but of lesser clinical value.

The temperature, which has not heretofore received attention as an important factor in the genesis of symptoms or in the diagnosis and prognosis of brain injuries, seems of primary importance. An elevation of temperature was an early, continuous, and very constant symptom in all classes of head injury. It would be difficult to trace a relationship between the character or location of the lesion and the comparative elevation of temperature. The increase was usually progressive, without much recession, and the

maximum was reached just before death, and sometimes afterward. Sufficient data are given to show that in probably no condition, except insolation, is the temperature so uniformly high as in cases of encephalic lesion.

The general principles of operative interference in cranial fractures and encephalic injury may be formulated as follows: Incision of the scalp, trephination, incision of the dura mater, and perforation of the brain, severally or together, when indicated. Incision of the scalp and trephining are devoid of danger and are always justifiable for exploration, which in itself constitutes an indication. Incision of the dura mater and incision or perforation of the brain are more serious procedures, and should be made only when positively indicated by the general symptomatology. Wals-ham⁶ says he has completely closed the wound without drainage after operations on the skull in six cases. In all, union by the first intention has practically been the result. In two of the cases the operation consisted in the removal of depressed and loose fragments of the cranium. In three the operation was that of craniectomy, and in the remaining case trephining for loss of memory. With the exception of the last case, a man aged 30, the patients were children. In the craniectomies and the case of trephining for loss of memory the bone was, of course, not replaced. Three other successful cases treated in this way are reported by Tytler.⁶ Jennings²⁶⁹ says that a fracture, although it causes no immediate symptoms, may be accompanied by splintering of the internal table, which is well calculated to lead to future mischief; and that the surgeon should operate in all such cases, and thus endeavor to avoid this danger. Mumford⁹⁹, draws the following conclusions from a study of 300 cases of fracture of the skull: Out of the 300 cases only 9 were in females; 170 patients died, 130 recovered. There were 165 fractures of the vault and 135 of the base or base and vault combined. There were 279 compound fractures and only 21 simple ones. Fractures from blows on the head are usually recovered from, after falls on the head about 50 per cent. die, and of the railway fractures 74 per cent. are fatal.

A very large number of fractures of the vault are complicated by extension to the base. Out of the whole number only 19 cases are reported as dying of sepsis, and 13 of these were prior to the

year 1885. Of the 19 cases, 6 fractures of the vault were trephined; 3 were fractures of the base and were not trephined. Of 149 compound fractures of the vault, 87 recovered. There is no case recorded where an exploration through the sound skin after an accident did harm. Trephining was done 62 times with 28 deaths. It was undertaken sometimes in desperate cases, and, even when the patient did not survive, there was often a temporary alleviation of symptoms. On the other hand, the advantages of trephining may be permanent and astonishing. In fractures of the base, free drainage is the one great essential for recovery.

Lutz¹⁰² gives the following rules for all compound fractures of the skull: 1. The removal of all extraneous material from the surroundings of the scalp wound and from the surfaces of the wound. 2. The removal by chisel or trephine of foreign bodies from between the lips of the fracture or from the surfaces of the meninges. 3. The closure by ligature of meningeal blood-vessels. 4. The enlargement of wounds of the dura. 5. Thorough packing and drainage of the wound.

In a case trephined by Lucas-Championnière¹⁴, the dura mater was intact, but a gray tint of the meninges and some small white points left no doubt of the existence of commencing meningo-encephalitis. All symptoms disappeared after the trephining. The author lays great stress on the advantages of early interference in these cases.

Lelandais²²⁰ reports the case, in the service of Duret, of a man who fell from his horse, and who, when brought to the hospital, was only partially conscious. He replied to questions by signs, and frequently carried the left hand to the forehead. There was no deviation of the face, but paralysis and anaesthesia of both extremities of the right side. Sensibility on the left side was somewhat diminished. The pupillary and palpebral reflexes were preserved, but were less marked on the right side. Pulse and respiration were normal. Paralysis of bladder and rectum. At the right fronto-parietal region there was a small linear wound, five to six centimetres in length. No fracture could be made out. The next day all the symptoms had increased, but there was no change in the pulse or respiration. The temperature ranged from $38\frac{1}{2}^{\circ}$ to 35° C. (101.4° to 95° F.). A collection of blood under the integument was evident, but no fracture could be made out. Trephin-

ing was done over the left region of Rolando, and the bony flap raised. At the lower margin of the wound a blood-clot, about two centimetres thick, ran toward the temporo-occipital fossa. When this was cleared away with a curette, a jet of dark blood came from the posterior and median part of the wound, supposed to be due to injury of the superior longitudinal sinus. It was tamponed and the wound closed. At the autopsy there was found a vast sub-aponeurotic extravasation of blood, occupying the left half of the cranium and extending even into the opposite occipito-temporal region. A fracture of the cranial vault, of half-moon shape, two centimetres from the median line, four centimetres long, and with a depression of five millimetres, existed at the posterior part of the parietal bone. This had been masked during life by extravasated blood. On the internal table corresponding to the external fracture, there were four fragments, inclined at angles to one another, and making a decided depression. From the centre of this fracture was a fissure which ran through the parieto-occipital suture, across the two superior occipital fossæ, the left occipito-temporal suture, then descending into the temporal fissure and ending at the foramen ovale. The longitudinal sinus was intact, and there was no trace of injury to the afferent vessels. The subdural haematoна, however, had been completely reproduced after the operation. The left temporal lobe was badly contused, but no other abnormality was discovered. Duret thought that the blood came from the veins of the diploë, and entered through the bony fissure, between the dura mater and the skull.

Burrano⁵⁸⁹ _{Nov. 17, 1892} reports the case of a patient, 26 years old, who had a lesion of the lambdoidal suture, from which pus escaped. This had been caused by a blow with a stone twelve days before. The bone was found very thin, so that before two turns of the trephine were made the instrument passed into the cranium and a quantity of pus escaped. The abscess was cleaned out and the patient made a good recovery. Grantano⁴¹ _{April 1893} operated on three severe lesions of the cranial vault, caused by blunt instruments. He replaced the bone and closed the wounds without drainage. The first two cases made prompt recoveries. The third, eleven weeks after his discharge from the hospital, returned with intolerable headache, vertigo, etc. It was supposed that one of the fragments had become displaced, but when the region was cut down

upon it was found that all the implanted pieces were perfectly smooth. The dura was very adherent, but an area of red softening was found in the brain. This was removed. The patient recovered from the operation, but the symptoms were not relieved.

Page and Hutchinson,⁹ report the case of a man in whom a large segment of the calvarium, about four and one-half by two and one-half inches, triangular in shape, was found depressed completely below the surface of the inner table. Its longest (posterior) border ran diagonally across the vertex, from five and one-half inches directly above the right to four inches above and one-half inch behind the left auditory meatus, while its obtuse angle lay directed forward at a point four and one-half inches above the middle of the superciliary ridge. The surface of the depressed portion and of the skull for from one-half to one inch all around, was completely stripped of periosteum, which, with the other tissue of the scalp, was turned forward in a huge, matted flap, swollen by extravasated blood to a thickness of fully two-thirds of an inch, and with its edges and under surface literally asphalted with coal-dust.

The cavity having been thoroughly cleansed and flushed with very hot (110° to 120° F.— 43.3° to 48.9° C.) boiled water, the head was shaved and a couple of buttons removed with a half-inch trephine, one in front about an inch from the right extremity of the fracture, and the other behind and about half an inch from the left extremity. The fragment was positively overlapped by the edges of the skull, and it was only by each taking an elevator and literally plying the edges backward and the fragment upward that it could be made to budge. When it did become loose, it was with such suddenness that the piece went flying not only clear of the wound, but almost clear of the table. Only a few shattered fragments of bone were left, at about the middle of the posterior border of the gap. The large fragment was promptly placed in a bowl of blood and hot water, and the operation proceeded with. After the shattered pieces were removed, and the surface of the inner table all around had been explored for splinters with the finger, the dura was found unbroken except at a point near the left acute angle of the gap, where a small spicule had been driven through it to the depth of about half an inch.

There was a good deal of bulging of the membranes, and

subdural hæmorrhage was feared; in fact, there was quite a free flow of blood through the puncture made by the spicule; but it appeared to be principally venous, and was checked entirely by prolonged affusion with hot (boiled) water poured out of a pitcher into the wound. This done, the fragment was taken out of the bowl of "culture-fluid," and, after much manipulation and the application of considerable lateral traction, was re-inserted into the gap, the sides of which held it as if in a vise. The wound was then freely flushed with a 15-volume solution of hydrogen dioxide, and the edges of the flap were thoroughly cleansed with the same solution and stitched together as accurately as possible, although perfect coaptation seemed almost out of the question on account of the swollen condition of the tissues of the scalp. No opening was left for drainage, and a simple pad of moist carbolized gauze dusted with iodoform was applied.

Almost immediately upon the elevation of the fragment the patient lifted his head, inquired where he was, and answered questions slowly, but rationally. About two weeks after the accident the probe detected a patch of bare bone, about half an inch in diameter, at the point of greatest splintering, and a number of tiny osseous spiculæ were discharged at intervals, up to as late as eight months afterward; but with this exception the whole fragment seems to have united with both peritoneum and diploë perfectly. A year after the accident the man had perfect control of all of his muscles, excepting those of the right leg and thigh, which still felt "heavy and stiff."

Kahlo⁵⁸ reports upon 50 cases of compound depressed fracture of the skull treated at the Harlem Hospital, New York. Of the 50 cases, 43 were males and 7 females. 16 were 10 years and under, 17 between 10 and 20, 6 between 20 and 30, 9 between 30 and 40, and 2 over 40. 20 cases involved the frontal bone, 25 the parietal, 10 the occipital, and 14 the temporal. In 9 there was also fracture at the base, 18 on the left side, 27 on the right, and in 5 both sides were involved. In 18 cases the fracture was simply compound and depressed. In 26 it was comminuted. 5 were gunshot injuries and 1 was a stab wound. The dura or brain was involved in 20 cases, but paralysis was present in only 6. In 3 the paralysis was primary and in 3 secondary. All but 6 were operated on. In 18 the chisel was employed.

In 10 the trephine and in 1 the Hey saw was used. The other 15 cases were comminuted, and the fragments were adjusted with the elevator and forceps. 32 recovered,—a mortality, including the fracture of the base, of 36 per cent. If these latter were excluded, however, the mortality is only 18 per cent. Where the brain or dura was involved, the death-rate was as high as 50 per cent. Only 1 of the 6 not operated upon recovered. His conclusions are as follow: 1. With proper antiseptic precautions the dangers from the operation itself are comparatively slight. 2. Early operation is necessary in all recent cases of compound depressed fractures of the skull, whether there be symptoms of compression or not, unless there is shock or some other contra-indication. The chisel is preferable to the trephine and an aseptic to an anti-septic operation.

Schaefer, of Chicago,⁶¹ gives the histories of 9 cases of injury to the head. In 3 trephining was done, and the patients recovered. In 2 no operation was undertaken and both recovered, one with considerable paralysis; in the others death occurred, 1 from meningitis, 1 from leptomeningitis, 1 from cerebral abscess and softening; the fourth was an extensive fracture of the base.

Roerdam⁹⁸ reports a case of very extensive comminuted fracture of the cranium in a 17-year-old peasant, who was thrown from a runaway wagon and tossed upon his head against a stone. After the accident the patient got up and walked about five hundred yards. When seen, an hour after the accident, he was greatly collapsed, unconscious, and now and then suffering from tonic and clonic spasms. In the middle of the forehead, extending from the inner edge of the left eyebrow to the outer end of the right eyebrow, and above up to the edge of the hair, there was a large contused wound, at the bottom of which the depressed cranium was to be seen, the fracture being about seven centimetres in length and four in breadth, and the points of the splinters being one centimetre deeper than their base. Under chloroform narcosis, with the hammer and chisel, the depressed fragments were removed and the edges smoothed off. The pulsating brain then presented itself at the opening, while a small tear in the dura mater was all that could be discovered. Five fragments in all were removed, one of them being of the size of a dollar, one of that of a half-dollar, and three

smaller ones. The wound was sutured, dressed antiseptically, a strip of iodoform wicking being introduced at the lower corner of the wound in order to insure drainage. During the whole course of the disease the temperature was normal. Fifty-two days after receiving the injury he was discharged from treatment, the wound having greatly decreased in size. Neither the nervous system nor the mind of the patient seemed to have suffered from the accident. A brass plate was made for him to place on his head when he wears his hat. Six weeks after the injury he walked some eight miles to his home.

White and Wood,⁵ in a report of surgical cases and methods, said that they elevated all depressed fractures, whether simple or compound, or whether brain-symptoms were present or absent. This treatment is in accordance with the practice of the great majority of modern surgeons; and in view of the number of cases not thus treated, who suffer from various forms of cerebral irritation or disease, it seems unfortunate that it was not the rule of practice long ago. The operation in itself is almost free from risk. Some of the simpler cases were closed without drainage; the compound comminuted fractures were drained by silk or a small tube. Of eight cases in which trephining was practiced, six recovered and two died. The two fatal cases succumbed soon after admission, from the violence of the injuries.

Dugan¹⁰¹ says that fracture of the skull in itself is not a serious injury. The danger to apprehend is (1) the damage sustained by the brain and its membranes; (2) the delay of surgical interference. His experience with fractures of the vault of the skull has been such as to justify the two following general conclusions: 1. The rational symptoms of compression coming on immediately after the receipt of an injury are due to injury of the cerebral tissue. 2. Those coming on later, hours or days, are due to congestion or inflammation of the cranial contents, excited by irritation of the depressed bone. All cases of punctured and gunshot fractures, with or without symptoms, should be explored without delay, as well as all compound fractures, with or without depression. Palliative and expectant treatment should be regarded as inefficient and hazardous. The only exception to this rule is in children where there exist neither symptoms nor depression.

All simple fractures with depression, regardless of age, with

or without symptoms, are not to be temporized with, and the patient's condition should be regarded as serious till every part of the depressed bone is removed or elevated. All simple fractures with symptoms, whether there be depression or not, should have the scalp incised and the skull trephined, for no one is able to predict the condition of the inner table by the character and extent of the lesion found in the external table. All cases with symptoms of compression, without the existence of fracture of the outer table, should be subjected to an exploratory craniotomy, provided the symptoms are such as to enable the operator to be reasonably certain of the location of the lesion. Exploratory operations in all simple fractures in the adult, even in the absence of symptoms of depression, should be undertaken.

No one should close a wound of the scalp till he is able to say positively that no fracture exists. If there remain the shadow of a doubt as to the existence or non-existence of a fracture, that doubt should be interpreted to mean that the scalp must be incised and the bone examined. In the doubt lies the danger.

Rawdon¹⁸⁷ reports the case of a girl, 17 years old, who had fallen from a window thirty-one feet high, impaling her head on one of the spikes of some iron railings. Before she reached the hospital she had lost a large quantity of blood and also some brain-matter. The fracture was through the occipital bone, and was situated two and a half inches above the "protuberance." It extended from the median line for an inch and three-fourths on the right side. The wound was enlarged, a small trephine employed, and a half-disc of bone removed; then, with the cutting forceps, the overlapping edges of the bone were cut away, and two fairly-large fragments of depressed bone, which were quite detached, were removed. It was evident that the one nearest the median line had acted as a plug to the laceration of the superior longitudinal sinus, because its removal was followed by an alarming haemorrhage. Fortunately, as sufficient bone had been cut away to permit of the rent being seen and dealt with, the bleeding was at once stopped by placing the end of the finger within the sinus. It was found that the expedient of raising the patient almost to a sitting posture arrested the haemorrhage, and gave time for the suturing (with fine catgut) of the lacerated edges,—a measure which was effectual. The usual antiseptic dressings were used.

Notwithstanding the careful support of the wound, in a week or ten days a hernia cerebri was noticed. The patient was not at all mentally affected, and at the end of about two months the wound began to cicatrize. As the healing proceeded the "hernia" receded, and she was discharged cured. It was subsequently ascertained, by using the perimeter, that the patient suffered from hemiopia of both eyes, but that the area of vision of the left was more decidedly limited.

Fillenbaum,²² in a man who had received a kick on the head from a horse, after removing the depressed bone in the temporal region, applied a celluloid plate over the space, which healed rapidly. In six similar operations the celluloid plate could not be borne, and had to be removed. Consot,⁵² reports two fractures of the cranial roof. The first recovered from the immediate effects of the fracture, but had paresis of the left side. His condition finally became such that operation was necessary. The depression of the skull was principally over the middle portion of the ascending frontal convolution. When the depression was removed, a sort of osteophyte, two millimetres thick, was found along the line of fracture of the internal table. He continued to improve, and eight months later was greatly benefited. The second case was also a depressed fracture of the skull just at the left of the sagittal line. In this case no operation was undertaken, but two small fragments of bone were exfoliated, and the patient recovered, with slight delusion as to the power of the right leg.

Aris³ reports the case of a girl, $3\frac{1}{2}$ years of age, who, six years after an accident, was trephined, in consequence of progressive paralysis of the left side. At the operation the right cortical motor region was found markedly depressed by osteophytes. He considers that, after a traumatism of the cranial vault, trephining should be undertaken as soon as hemiplegia and other symptoms of compression make their appearance. Cerné²⁰³ says that, in 6 of his cases of fractured cranium, 2 recovered and 4 died. In none of the fatal cases could the result be imputed to the operation.

Popper³⁹⁸ operated on a girl, 14 years old, who had a fracture, from a horse's kick, five centimetres long by four and one-half centimetres wide, and involving the left parietal bone close to the median line. The external table was completely shattered, the internal table being bent down, making pressure on the brain.

On two sides, where the internal table was fractured, the membranes were pushed through the crevice. This depressed portion of the skull was removed, when a tremendous hæmorrhage took place from the sinus. This was controlled by an iodoform tampon and by digital compression. The brain was injured to the depth of one and one-half to two centimetres. The tampon which controlled the hæmorrhage was left in place and the wound closed. On the fifth day the tampon was partially, and on the seventh day entirely, removed, and for seventeen days the patient could not speak. Complete recovery was obtained.

Froumy,⁴⁵⁴ in a case of fracture of the skull in a child 2 years of age, took a cupping-glass, the base being large enough to circumscribe the fragment and to rest upon the firm bone, and attached it firmly to the skull with glaziers' putty. He then applied Potain's pump, and as the air was exhausted the fragment rose nearly to its normal position. The symptoms of compression gradually disappeared, and the child recovered.

Other cases are reported by Simons,⁸² Seydel,³⁴ Schooler,⁷² Lucas,²² Vaughan, Stevens, Crocker, Jones, Driver, and Clarke,⁹⁹ Verity,¹³⁹ Monro,²¹³ Lediard,⁶ Ashhurst,¹¹² Smith,¹⁴⁷ Prendergast,⁶ Allen,²⁸⁵ Wright,⁴³ Langford,³⁹ Jackson,⁹⁹ Armstrong,⁷⁶⁰ Wyman,³³⁹ Peeples,¹ Garcin,⁸¹ Eiselberg,²² Williams,⁴³⁰ Peyrot,¹⁴ Hurt,²⁰⁷ Lafond,²³⁹ McIntyre,¹² Wight,¹⁵⁷ Demmler¹⁰⁰; Klemm, of Riga²¹; Borelius,⁶⁸ Pratt,²² Cooke and Laycock,²⁸⁵ Browning,⁸⁷ Baldwin⁷⁷ Means,²³³ Williamson,¹⁴⁷ Da Costa,⁹ Hassler,²¹¹ Kocher,³³⁶ Zeller,¹⁸³ and Park.⁹

WOUNDS OF THE BRAIN.

Rideal,² reports the case of a man who attempted to commit suicide by firing four revolver-bullets into his head and body. In neither of the scalp wounds could any trace of damaged bone be made out, although the force was sufficient to entirely flatten a conical bullet of large size. There was no abscess formed by the flattened bullet, although it had been in the scalp fourteen days, and the wound made for its removal was completely healed by the next day.

Brown,⁶ operated on a boy of 17, who was accidentally shot by a revolver and did not at first become unconscious, but was able to sit up and walk for a quarter of an hour. During this

time efforts were being made to stop the bleeding, and the bullet, which was lying loose in the wound, was picked out. He gradually became unconscious; the breathing was slightly stertorous, the pupils dilated and unequal, not reacting to light; and when he was interfered with, he occasionally moved the right arm and leg, but not the left members. On enlarging and opening the wound, an elongated hole was found in the skull, running from before backward, its width being about equal to the thickness of the bullet, and the length about one inch and three-fourths. This was enlarged and the blood-clot and brain *débris* removed, and the boy made a good recovery.

Von Bergmann,⁸⁴ says that in cases of shot wounds of the skull the wounds should be closed exactly as in wounds of the knee and protected against slight injuries. When no symptoms are present operative intervention is unnecessary, but immediate and severe symptoms of irritation, such as contractures, epileptiform convulsions, monoplegia, etc., justify an operation. If, however, the symptoms of irritation occur later, the author does not advise trephining.

Bimler²⁴³ reports the case of a soldier who was struck by a rapier, receiving a linear wound one a half centimetres long below the right eye. The eye was not injured. The next morning there was complete cross-paralysis, and on the second day he died. At the autopsy laceration of the middle meningeal and Sylvian arteries was found. There was also a meningo-cephalitis.

Cabot⁹⁹ reports the case of a man with a bullet wound of the head, situated one and a half inches above a line drawn from the external orbital process to the junction of the helix of the ear to the scalp, and nearly over the centre of this line, being slightly nearer to the ear than to the orbital process. Post-mortem examination showed the brain-substance to be more widely destroyed close to the wound of entrance than on the farther side.

Brokaw¹⁰¹ reports that while attending a case his attention was called to another person who was present, who had an old, unhealed wound of the head, about an inch above and two inches back of the left ear, which had not healed. A suppurating sinus was found, and under the surface of the scalp some firmly-fixed metallic substance. The man said that he had been stabbed in the head about six months before. At the operation the broken

end of a knife-blade that had apparently not penetrated the skull, but remained firmly imbedded in it, was removed.

Trouillet²⁴⁸ reports the case of a man who fell one and a half to two metres, striking the top of his head. At the autopsy no fracture of the cranial vault was found, but at the base of the cranium there were multiple fractures of all the bones, a complete breaking up of all the bony parts of the three fossæ.

Barry⁷⁷¹,_{Jan. 18} reports the case of a man who was shot in 1876, whose skull was penetrated and brain injured (determined by digital exploration), and who has remained well ever since without symptoms of any kind. Other cases have been reported by Mouchet,⁷_{Feb. 24} Ashurst,⁴⁵⁷_{Aug.} Googe¹¹⁷_{Aug.}; Coltman, Jr.²³⁵_{Mar.}; Johnston, of Montreal²⁸²_{Jan.}; Winne,¹⁰⁵_{Apr.} Wheaton,¹⁰⁵_{Apr. 18} Cornière,⁷_{Dec. 12} Cullen,⁶_{June 24} Wyman,²³⁹_{Mar.} Park.⁹_{Dec. 8, '22}

EPILEPSY.

Gerster and Sachs⁵_{Nov. '22} record their joint experiences in the surgical treatment of epilepsy. The cases operated upon were selected with considerable care, and were either of distinctly traumatic origin or a strictly localized convulsion pointed to a limited focus of disease. They do not claim a single decided cure. In several of the cases there was a marked diminution of the attacks immediately after the operation; in some the improvement lasted for a few months; but in every case the attacks recurred after a lapse of several months or even less. The cause assigned for such unsatisfactory results is the fact that they came under observation after the epilepsy had been established for many years. They conclude with a plea for prompt surgical interference in all cases of traumatic injury to the skull in which there is any reason to suppose that serious harm has been done to the brain, and also in those cases in which the occurrence of a localized haemorrhage of non-traumatic origin is more than likely to give rise to epilepsy later on.

Blumer²⁷⁸_{Oct. '22} detailed the histories of eight cases of trephining in which little or no improvement resulted. Castration was performed in one case, but, though the general health improved, the seizures remained the same in character and number.

Fraenkel,¹¹²_{Apr.} in searching for the causes of recurrence, suggests as one the incompleteness of extirpation of the affected motor centres. He operated on six dogs, and in two of them marked

symptoms of cortical epilepsy followed; and he suggests that the attachment of the scar at the seat of operation and its subsequent contraction act as an irritant to the surrounding cortical substance, and thus serve to stimulate the recurrence of the epileptiform symptoms.

Van Gieson⁵⁹ studied the pathology of traumatic epilepsy, using as a basis portions removed from two brains of epileptics operated upon by McBurney. In the first case this material was composed of (1) a rigid plate of connective tissue acting as a foreign body and pressing against the brain; (2) changes in the pia mater; (3) certain lesions of the cortex of the brain, consisting of both changes in the ganglion cells and in the neuroglia. The article cannot fairly be represented by an abstract.

Roberts²²⁴ operated on a man, 28 years of age, who thirteen years before had been struck on the side of the head. A few months later he began to have dizzy spells, and shortly afterward epileptic convulsions. The cicatrix was exceedingly sensitive, and pressure upon it gave him a peculiar sensation in his head.

Parker and Gotch²²⁵ report the case of a boy, 9 years old, who had fallen on the right side of his head, and three weeks after began to develop epilepsy, affecting particularly the left side, and increasing in severity. The areas for the thumb and wrist were removed. The patient has somewhat improved.

Ruiz,⁷⁴ in a child 10 years of age, removed a button of bone from about the middle of the fissure of Rolando. A small portion of broken-down brain-tissue was discovered and scraped out, and the child made a complete recovery.

Briddon⁹⁶ reports a case which, a little over a year after an injury to the head, had a general convolution, followed by twitchings of the facial muscles. The patient showed evidences of right hemiparesis; the face did not act evenly; he moved slowly, and limped slightly in walking; he was mentally very dull; could not follow rapid conversation or answer questions put rapidly; hesitated much in expressing his words, and had much difficulty in recalling the words which he wanted to use. He was able to enunciate clearly; could read, write, and copy, but in talking made mistakes. Sensation was good to all tests, and there was no ataxia of motion. There was a depressed fracture of the skull, to be felt through the skin, about two and a half inches in length, extending

from above downward and forward over speech and face areas. The fissure of Rolando having been located, the face-centre was localized and two trephine-buttons removed. The dura was found to be at least two-thirds thicker than normal. The pia mater was also thickened. No cyst was found, but in the lower half of the opening there appeared to be a depression in the brain-substance, with some elevation surrounding it. In the pia mater a mass of connective tissue, resembling a honey-comb in appearance, was noticed, which was closely adherent to the brain-cortex. This was probably the remains of a surface clot, or of the attempt of nature to repair destroyed brain-tissue beneath the seat of fracture. It filled in a deep fissure, and was adherent to the brain-convolution bordering the upper side of this fissure. When this tissue was divided it was impossible to dissect it away from the brain, and a slight incision into the brain-substance demonstrated a marked thinning of the cortex at this area. It was evident that subsequent to the original injury a chronic localized meningitis, with production of much new connective tissue, had taken place, leaving a thick mass and a partly-destroyed brain-cortex. It seemed impossible to remove this mass of connective tissue without destroying brain-substance. Brain about the mass appeared to be healthy. Starr, the consulting neurologist, was satisfied that further procedure was useless. The day following the operation he had two slight twitchings of the facial muscles, but up to the time of leaving the hospital his recovery had been uninterrupted. Mallherbe ²² _{Apr. 10} reports the case of a woman, aged 52, who fell on her head from a window. A long cut on the forehead was the immediate result. On the fifth day after the accident the patient was seized with convulsions, commencing in the face and passing to the right side of the body. A trephine was applied to the frontal eminence, and when the dura mater was brought to view a crucial incision was made in it, but no apparent lesion of the brain existed. A drain of iodoform gauze was placed in the wound and the skin sutured simply over the osseous aperture. The convulsions ceased immediately. Four days subsequently the patient had recovered complete consciousness and the memory returned.

Djeneil-Bey, of Constantinople, ¹⁴ _{Apr. 10} reports the case of a man, 30 years of age, who two years before had received an injury to the right fronto-parietal region. Eight months later he began to

have epilepsy. At the operation a splinter of bone from the internal table was found penetrating the brain in the Rolandic region. Fifty-one days after this operation he developed an abscess of the brain, which was operated on, and the patient made a satisfactory recovery.

Chipault ¹⁰⁹⁰ _{v.1,p.162} reports a case of Jacksonian epilepsy, with variable aura, in which an extended exploration was unsuccessful. The patient was 46 years of age, and had fallen on his head when but 15 years old. There was no wound at this time. Fifteen to eighteen years later he had violent frontal headache with vomiting, and at the end of one of these attacks his head was turned violently toward the left shoulder. The attacks gradually became more severe, until he developed distinct epilepsy with complete paralysis of the left arm. Sensibility of the arm and leg of the left side was diminished. At the operation nothing was found, and he died not quite a month afterward. At the autopsy, at the level of the exploratory incision, in the ascending frontal lobe, there was a spot of acute degeneration large enough to admit the end of the little finger. In the second frontal convolution, about three centimetres from its origin from the ascending frontal, there was a grayish, softened spot about half a centimetre below the surface. In the white substance a tumor was found about the size of a cherry, of grayish color, and in the anterior part of it there was a small cystic cavity. The microscopical examination proved it to be a glioma.

Tietze ⁹⁰ _{Apr.} reports the case of a man in whom traumatic epilepsy was complicated with motor paralysis of the right hand and face, with affection of speech; the leg was unaffected. In the outer quadrant of the right field of vision was a scotoma, and at a later date a similar one was detected in the left field. Trephining was performed by Mikulicz. Two cysticerci were found in the motor area of the cortex, one in the middle third of the ascending frontal convolution, the other in the lower third. The operation was followed by mental disturbances, aphasia, and paralytic weakness of the arm. These symptoms gradually disappeared, and the patient was discharged after two months. Three convulsive attacks occurred after the operation, the last seven weeks before the case was reported. With this exception the patient was very much benefited by the operation.

Borelius⁶⁸ operated on a woman, 26 years of age, who, when 13 years old, had received an injury of the left side of the head with immediate paralysis of the right side. This improved somewhat, but occasionally there had been epileptic attacks, the last of which she had about four years before. There was a depression in the parietal region. The dura was adherent to the brain and the cortex was congested and degenerated. This degenerated tissue was removed and a cyst, the size of a hen's egg, was found. As much of the wall was removed as possible, and some immediate contraction was noticed. After the twenty-sixth day, however, she developed symptoms of cerebral pressure. Though the wound was reopened and the clots removed, she grew worse and died five weeks after the operation. The autopsy revealed meningitis at the base of the brain. The cyst had destroyed the greater part of the central gyri and several adjoining gyri, and also the posterior portion of the internal capsule and a considerable part of its centrum ovale.

Shiels, of San Francisco,¹⁴⁷ operated on an epileptic who fell during a fit and fractured his skull. He trephined and removed an extensive portion of the bone over the fissure of Rolando. The patient remained free from seizures for some time.

In another case developing epileptic insanity the fissure of Rolando was exposed, and that portion of the brain was pricked thoroughly with a sharp needle. This patient has not had epilepsy since. He believes that, if we can get at the cortical irritation by mechanical means, such a change may be produced that the epileptic explosions can be checked.

Briggs¹²⁰ says that he has operated upon 50 cases of traumatic epilepsy and confidently claims 80 per cent. of cures, while the mortality has been only 2 in 60. The operation should, however, only be done in cases in which the point of irritation can be positively determined.

White and Wood⁵ allude to twenty-four cases of supposed traumatic epilepsy, all of which were at least temporarily relieved by operation.

Cole,⁸⁴ Clark,¹⁸² Manley,¹⁰¹ Olmsted,⁹⁸ and Lovegrove,⁵⁵⁷ all report cases where the immediate effects of the operation indicate improvement in the symptoms, but which had not been under observation for a sufficient period to determine the ultimate result.

Fischer⁷⁷ and Wyman⁸⁸ report fatal cases. Park⁹ states that after an operation for epilepsy medicinal and dietetic treatment should be kept up for five years. If this were done the results would be much better than those we now hear of. This refers not only to head injury, in which the conventional operations about the skull are performed, but also to peripheral irritations in other parts of the body, necessitating various other operations. He calls attention to two or three cases of epilepsy which he had operated on with results which had been encouraging, but in no case perfectly satisfactory.

Corresponding Editor Szadek, of Poland,⁶⁷⁸ has furnished the report of a case of idiopathic epilepsy in a boy, 16 years old, who was very markedly benefited by resection of the median lobe of the thyroid gland, performed by Bogdanik.⁵⁰⁹ The case was one of grand mal, of two years' duration, the attacks occurring daily. After the operation the patient was under observation two months, during which time he only had slight attacks.

Kocher, of Bern,⁸⁴, agrees with Horsley, that all traumatic epilepsies should be operated upon, and the centre from which the initial explosion occurs removed. Those cases in which a cyst has developed are favorable for operative interference. He has observed five such cases. He considers an epileptic attack as a cerebral commotion, caused by sudden intra-cranial oscillations of pressure and subsequent disturbances of cicatrization, with an abnormal excitability of certain parts of the cerebrum, particularly in the region of the cortex.

Kümmell⁸⁴⁴ describes two cases of genuine epilepsy which he had attempted, without success, to control by ligaturing the vertebral artery. He also describes a case in which he extirpated the superior cervical ganglion by W. Alexander's method. After this operation there was a distinct change in the pupil, a marked reddening and increased temperature of half of the face, increased secretion in the mucous membrane of the nose, and headache on the same side. This operation was only temporarily successful. He also operated on five cases by trephining, but was unable to find any lesion. In Jacksonian epilepsy following a traumatism, however, the results were better. Out of three cases reported, two were cured and one improved. Schede⁶⁹, reported five cases, all of which were either cured or improved.

Warnots, of Brussels,¹⁵² reports ten cases of Jacksonian epilepsy, in nine of which the lesion was caused by bone-splinters, lacerations of the meninges, or old effusions of blood. In one there was an arterio-venous aneurism, which had developed under an old fracture. In eight of the cases the usual method of operating was resorted to, but only the direct cause was removed. In the tenth case, not only was the cause removed, but also that portion of the cortex which included the centre in which the signal symptom developed. He also reports a case of essential epilepsy, in which the cortex was explored by electricity. The application of the electrode over the motor area of the upper limb caused a violent reaction in that member. The current was very much reduced when exploration of the areas controlling motion in the lower limb resulted in decided reaction of the upper extremity and tonic-clonic spasms in the middle of the body on the same side. He found under Pacchioni's corpuscles, which had quite markedly invaded this portion of the cortex, a yellowish, small, transparent exudation, which had at first escaped notice. This was completely removed. The fits disappeared for several weeks, but the patient developed an epileptic vertigo every four or five days in the right upper extremity. He did not have any more epileptic paroxysm, however.

Postempski⁹⁶ operated on a young man of 24, with cortical epilepsy. At the point of operation over the motor areas, the diploë was found wanting, but the dura was apparently healthy. This patient was worse after the operation, and it was proposed to intervene again, removing a portion of the cortex.

Casselli⁹⁶ also reported four cases of traumatic epilepsy, the first evidently caused by an old fracture, and eleven pieces of bone were removed. The improvement began in twenty-four hours, and in six months the patient had only two slight attacks. The second case was also one of old fracture in the right parietal region, in which a wooden peg remained imbedded in the cranial cavity for some minutes. Epilepsy developed two years after the injury, and no convulsions were observed for six months after the operation. The third case had infrequent and slight attacks during the four months following the operation, while the fourth remained free from recurrence for the same length of time.

Taussini⁹⁶ operated for epilepsy on a patient who had a

marked asymmetry of the skull. At first he had slight but very short attacks, but these finally disappeared and had not recurred for two months.

GENERAL PARALYSIS OF THE INSANE.

Wade²⁰⁰¹ calls attention to the great importance of operating on all cases of depressed fracture of the cranium at the time of the reception of the injury, however slight the depression. In all cases admitted to insane hospitals careful inquiry and examination should be made as to cranial injuries, and where any depression is discovered an operation is certainly indicated, which in itself is not dangerous, and which gives promise of some improvement, if not entire restoration, of the mental faculties.

Goodall_{July 18, Aug. 26}² believes that a study of the cerebral cortex fully justifies trephining, followed by drainage of the subarachnoid space.

Lanphear,¹¹² in a paper on trephining for softening following cerebral haemorrhage, states that if the skull be opened in such cases the brain and its membranes will often look swollen, and feel as if there were a sac full of fluid beneath. Puncture allows the escape of the softened mass, semi-fluid in consistence, of purulent appearance, but in reality not pus. Frequently the area of softening is but a limited one, as in embolism of that branch of the middle cerebral which supplies the arm-centre and the speech-area. Such cases are amenable to surgical treatment; not, indeed, as an operation to be made with the object of improving a paralysis or other manifestation of destruction of the cortex or communicating fibres, but of clearing out a quantity of irritating material and substituting one (like the blood-serum or cerebro-spinal fluid) which will, within a brief period, fill the cavity and not give rise to symptoms of irritation. Such an operation is demonstrated to be practicable in a case which the author describes.

MISCELLANEOUS CEREBRAL OPERATIONS.

Hahn, of Berlin.²⁰⁰³ reports the case of a patient, 30 years old, who had suffered for three years with intense cephalgia. He gradually lost the sense of smell, memory became weak, and two years ago he began to grow blind in the left eye, the right being affected later on. Temporary resection of the skull on the

left side of the frontal bone was performed, and revealed a very tense, non-pulsatile dura. This was incised, when there was immediately a walnut-sized hernia cerebri. This was removed, but a new hernia formed. Puncture with a long needle toward the anterior horn of the left lateral ventricle evacuated 100 to 120 grammes (3½ to 4 ounces) of clear fluid, after which there was considerable shrinking of the brain. All symptoms of cerebral pressure disappeared. Eighteen months after the operation power of vision had improved, and the patient was able to resume his usual vocation.

Parkin,⁶ in a paper on "The Relief of Intra-cranial Pressure by the Withdrawal of Cerebro-spinal Fluid from the Basal Subarachnoid Cavity," reports a case in which the cerebro-spinal fluid was drained away through an opening made at the level of the fifth and sixth cervical vertebræ. In this case the relief was marked, but there were other points of tubercular disease which prevented recovery. In a second case there was evidently a meningeal cyst, which was drained, and the child decidedly improved. The third case was drained through an opening made below the superior curved line of the occipital, on the right side. In passing a curved probe along the under surface of the cerebellum and slightly raising it a very large quantity of clear cerebro-spinal fluid escaped. A very fine drainage-tube was inserted, but this child was also markedly tubercular, and died.

Morton,⁶ in regard to tapping the skull for tubercular meningitis, says that the temporary benefit derived in the few cases already operated upon might be encouraging, but he is afraid that the operation will meet with little success.

SURGERY OF THE SPINE.

A most exhaustive treatise on this subject has just been published by Chipault, of Paris.

Fractures.—Hammond²⁴² says that pressure prolonged for any length of time invariably causes degeneration, both ascending and descending, of the different tracts in the cord. Relief of the pressure is not followed by any diminution of the degeneration. But relief of the pressure prevents the process of degeneration from

beginning. Hence, the surgeon should operate as soon as possible after the injury to the cord has been received.

Lloyd,⁵ after a study of one hundred and three cases, agrees with Horsley that operation should be undertaken at once "in all cases where displacement or crepitus indicate compression, and where extension directly after the accident clearly fails to reduce the deformity," provided there are symptoms present which indicate interference with the functions of the cord. In other cases the operator should wait until the shock following the injury has been overcome. During this time, however, the patient's condition should be most carefully watched, and at the first indication of any symptoms pointing to an extension of the interference with the action of the spinal cord, whether that interference be due to haemorrhage or myelitis from compression, to callus, or to the exudation of lymph, he should be subjected to operation at once.

Hammond reports three cases : In one of these, operated upon by Powell, there was paralysis of the sphincters of the bladder and anus, but no other muscular paralysis ; knee-jerk was present in both legs, but was sluggish. The gait was slightly ataxic ; all forms of sensibility were nearly normal in the feet, legs, and thighs, but he was not always accurate in locating a touch on the buttocks and thighs, and the muscular sense below the knees was slightly diminished. There was an area of absolute loss of all forms of sensibility, circular in extent, with the anus as a centre and a diameter of three inches. There was a fracture of the eleventh dorsal vertebra ; a piece of the bone pressing against the posterior columns of the cord was removed. At the end of two months the patient seemed to be perfectly well. Villar¹⁰⁰, reports the case of a man of 23, who was struck on the back and immediately felt great pain in the lumbar region. When examined, soon after the accident, a depression was found corresponding to the twelfth dorsal vertebra. He had complete paralysis and anaesthesia of both legs. He was trephined on the fourth day, and the cord was found pressed between the plates of bone. These were removed, and three weeks later he had recovered motion in the right leg, but sensation had not returned. The man's condition has continued to improve, but the left side is still paralyzed. Pain has disappeared and he is able to control urination.

Bird²⁸⁵ operated on two cases. In the one, as was to be

expected from the nature of the injury, no improvement followed. In the other, the patient gradually recovered both sensation and motion to a very great extent, but he still occasionally has to use the catheter and has troublesome constipation.

Davies⁶,²² reports the case of a man who, in a sudden fit of suicidal mania, made a rush, head-foremost, against plate-glass a quarter of an inch thick, and later against a wall. He became partially unconscious, had pain on movement and pressure over the cervical spines, but no deformity; paraplegia and anæsthesia extending upward to a line three inches above the nipples, diaphragmatic respiration, retention of urine, reflexes absent. Temperature gradually rose, until at the time of death it was 106.6° F. (41.5° C.). At the autopsy a T-shaped fracture of the body of the fifth cervical vertebra was found splitting the body into three parts, with a V-shaped fracture of both laminæ at a point near the junction of the posterior laminæ with the transverse processes. No displacement of the fragments was noticeable. On opening the vertebral canal the spinal meninges bulged out, and on incising these a large amount of dark blood escaped, being sufficient in amount to cause some compression of the cord. The spinal cord at the seat of fracture was not examined. Körte²²,²³ also relates a case, which he attempted to relieve by trepanning, but the cord was too severely crushed. The majority of these cases end fatally. Of 270 cases collected by Genet, only 53 recovered.

In a case operated upon by Pantzer,¹,²⁴ the patient was still perfectly well thirteen months after the operation. The same author also reports an unsuccessful case. Warren²⁶,²⁷ also presents the history of a case, operated on in the Massachusetts General Hospital over twenty-five years ago, which resulted fatally.

Chipault⁹¹,⁹⁶ states that in performing laminectomy for the relief of traumatic lesions it is not now considered sufficient for the operator to content himself simply with the removal of a greater or lesser number of arches, but in order to make the procedure complete it is essential that the dura mater should be opened and the intra-dural and medullary lesions treated. By this means the value of the operation has been enhanced. Out of 160 cases analyzed by Chipault, 20 were cured, 33 were improved, 22 gave no improvement, and there were 65 deaths and 15 unknown results. This proportion of successes to deaths is decidedly dis-

couraging. The deaths were all due, however, with the exception of two cervical cases that died from operative haemorrhage, to one of the three following causes: 1. The extreme gravity of the traumatism, the injury soon affecting the respiratory centre, or else there were lesions of other organs also present. 2. Infection through the operative wound, which was so grave and so frequent an accident in pre-antiseptic days. 3. Infection through the lungs, bladder, or bed-sores consequent upon the injury of the spinal cord. The first class is naturally beyond surgical assistance, the second should not be considered at the present time, while the third can be controlled somewhat by antisepsis of the bladder and the ulcerations.

Phelps²⁴² has performed laminectomy for Pott's disease in two cases; both patients died,—the first of pneumonia after thirty-seven days, the second from exhaustion at the end of a month. He states that the mortality from operations for Pott's disease is about 40 per cent. He has compiled all the cases published since Lloyd's paper (see Section H, this volume), about forty in number, and finds that the percentage varies but little. A safe rule to follow in any case would be to treat the patient mechanically for a time,—say, two months,—and if the paralysis continue to increase, or if it become complete, operate. Cases with complete paralysis, with incontinence either of urine or faeces, of several months' or even weeks' duration, should be operated on if they do not immediately improve under treatment. Whenever well-defined abscesses are present burrowing through the canal with gradually-increasing paralysis, they should be opened, the cavity scraped out, good drainage established, and the spinal column examined. Operate in cases of pressure threatening destruction of the cord. Chipault's statistics include five cases of operation in non-paraplegic cases and one hundred and three for Pott's paraplegia.

Lane²² operated on a woman, 54 years of age, who had suffered for only a few weeks from progressive symptoms of compression of the cord.

Horsley²² states that although it is usually stated that the bony deformity associated with caries of the spine is the chief source of the pressure symptoms as shown by the paraplegia, there is another and very important cause—the thickening from chronic inflammatory changes of the tissue surrounding the theca. When

signs of compression suddenly supervene, they may be due to the rupture of an abscess into the neural canal, haemorrhage, or displacement of the vertebrae. As a rule, in these cases, all the tissues in the neural canal are in a state of chronic inflammation, and the sac-wall becomes adherent to the theca. These tissues were likely to cause much compression. In the great majority of instances no change is noticeable in either the membranes or the cord inside the theca, and for this reason Horsley does not favor opening the theca when operating. There is evidence to prove that tubercular disease inside the dura mater of the cord does not exist. In the majority of cases the pachymeningitis causes pressure symptoms. Most of these cases do well under rest, but much depends upon whether the inflammatory lesion is of the nature of an abscess or of a chronic pachymeningitis. In the latter case the prognosis is good, while in the former it is by no means so favorable. The most-marked symptom of compression caries is the great loss of motor power with retention of a fair degree of sensory power. Careful examination should be made to determine the presence and extent of the anaesthesia, as this may give a clue to the seat of the lesion. The deep reflexes are exaggerated according to the extent of the involvement of the cord. The vesical, lumbar, and rectal centres may be involved early in the course of the disease. When recovery takes place from bony ankylosis, the process is an extremely slow one; the age of the patient has much to do with the result. In old patients, when the disease is due to senile struma, the prognosis is invariably bad, much worse than in young persons. If the case come under observation early, the patient should be put in elastic extension. This is by far the best method of treating caries of the spine, and there is none better for obliterating the curvature. There is not much to be said in favor of Sayre's jacket; in some cases it may be useful, but in all the patients upon whom Horsley had been obliged to operate these jackets had been employed.

If under the elastic-extension treatment no improvement took place in the paraplegia after a fair trial, then the question of operation would have to be considered. Experience showed that the acme of the curvature corresponded to the point a little below which the greatest compression existed. In the event of an abscess having been found to cause the pressure symptoms, this

was incised and the pus let out; afterward the abscess-cavity was syringed out with some antiseptic solution, a tube was inserted, and drainage secured from behind. In operating upon these cases it was essential to recollect the contingency of general tuberculosis following as the result of direct infection of the operation wound. The recovery of power resulting from the performance of laminectomy for caries of the spine usually began fourteen days after the operation. This was the average period; but sometimes the improvement was much slower in its appearance. There were, of course, some failures in these cases; they are usually due to an incomplete operation, but in some instances the cord had undergone severe injury preparatory to any operative interference having been attempted. Afterward it was advisable to apply a splint.

In illustrating these remarks, Horsley presented several patients upon whom laminectomy had been performed. Attention was called to the sodden appearance of the wounds, which was attributed to the escape of cerebro-spinal fluid always keeping the wound surfaces moist; it did not, however, interfere with the primary union.

Gardner, Delorme, and Pick have also reported cases of laminectomy; the former's patient was not improved, Delorme's case died, while the last was reported at the time of the operation, and the final result is unknown.

Cheyne and Symonds,² Noble Smith,²⁰⁸⁵ Chipault,²⁰⁸⁵ and Lloyd⁹⁶ all advocate the operative treatment of spinal abscesses,—laying open the pockets, incising and dilating the sinuses, and carefully disposing of all diverticuli. Careful irrigation and scraping are essential points in the treatment.

GUNSHOT WOUNDS AND OTHER INJURIES OF SPINAL CORD.

Crutcher¹⁰ reports the case of a man who was shot with a ball of rather small calibre, about six inches from the spinal column. He was completely paralyzed in the lower extremities and partially in the upper. Anæsthesia extended to a line below the nipples, and the cord was found to be injured. He died of pneumonia three weeks later.

Eskridge⁹ reports a case of traumatic myelitis in a patient who was shot at the level of the ninth dorsal vertebra. She at once became paraplegic, but there was a slight plantar reflex; all

the other reflexes up to the eighth rib were completely abolished. Anæsthesia extended up to this point. The operation was performed by Boyce, and no cause of pressure either from the ball, depressed bone, or effused blood was found. The laminæ of the fourth dorsal were then removed, but no further information was gained. There was no sign of the ball or its track. The patient died two months later, and on opening the dura a thick layer of yellow pus was found surrounding the pia and cord from the fourth to the eighth dorsal vertebræ, throughout the extent to which the canal was exposed at the operation. The cord at the ninth dorsal segment was a soft, pulpy mass, and on cutting it across at this point the softened cord-substance ran out, showing that it had been almost completely destroyed for the space of nearly half an inch.

Lane⁶ reports the case of a woman, 35 years of age, who, twelve years before, had on several occasions been struck violently over the lumbar spine. About six years later she noticed that her walk was insecure and that she rolled about, especially to the right side. Her back also became weak, and, though she suffered no pain there, she had difficulty in carrying heavy objects, particularly up and down stairs. This condition gradually increased, and a deformity of the lumbar spine developed. When she was admitted to the hospital it was noted that there was a kyphosis, the apex of which corresponded to the spinous processes of the third and fourth lumbar vertebræ. Compression paraplegia was suspected in spite of the indefinite history, and the spine and laminæ of the fourth lumbar vertebra were removed. The distension of the dura-matral sheath at this point with fluid indicated that the compression was lower down. The fifth lumbar vertebra was found to be placed in the upper part of the sacral canal, quite in front of its normal position. Lane says that this case is of great interest because of its rarity, and, so far as he knows, it is the only case of spondylolisthesis of the fifth lumbar vertebra in which pressure on the lumbar and sacral nerves was described. He had found that spondylolisthesis was the normal condition in coal-heavers, and in other occupations a similar displacement existed.

Morton¹¹² reports the case of a man who was struck in the dorsal region by a mass of coal which he was mining. He had immediate paraplegia and some irregular areas of anæsthesia of the

lower limbs and bed-sores. He was treated by rest on his back, massage, faradism, and head-extension. Twice daily he was suspended by his head. He made an uninterrupted recovery, being able to walk about with slight assistance.

Barrow²² operated on a man with a fracture of the cervical spine and compression of the cord. There was absolute paraplegia of the whole body excepting the head, abdominal breathing, and loss of all sensation up to about the nipples.

Leckie,²³ in cases of destruction of a small portion of spinal cord after fracture, suggests the feasibility of removing a sufficient amount of the spinal column to allow of the approximation of portions of the cord which have not been affected by the injury. He advances no method of carrying out his suggestion.

Puncture of the spinal canal and evacuation of a portion of the cerebro-spinal fluid have been recommended by Quincke^{118, 101} in hydrocephalus, for the purpose of reducing the pressure in the central nervous system. He has operated twenty-two times. Ziemssen has employed this procedure in several cases of tuberculous cerebro-spinal meningitis, cerebral tumors, etc. The puncture is performed under chloroform narcosis, and the spine must be flexed so as to enlarge the interspaces between the vertebral arches. According to the existing conditions of pressure the cerebro-spinal fluid flows out more or less rapidly. In simple hydrocephalus the evacuated fluid is clear; in a case of epidemic cerebro-spinal meningitis the exudation was turbid, and contained shreds of fibrin and diplococci. In both these diseases a decrease of cerebral pressure always ensued after the puncture. Decided improvement was observed in a case of tuberculous meningitis, the puncture being repeated four times. Examination of the evacuated fluid may throw some light upon the diagnosis.

Tumors.—Caponnotto⁵⁸⁹ operated on a patient who, when 6 years of age, had received an injury to the cervical region. Thirteen years later symptoms of a spinal tumor developed. The arches of the second and third dorsal vertebrae were removed, and a whitish intra-dural tumor, the upper edge of which corresponded to the third vertebra, was discovered. It extended down to the lower margin of the fifth vertebra. The tumor occupied the whole dural sheath, so that hardly a trace of the spinal cord was found. It was a fibro-sarcoma.

Chipault²⁰⁸⁵ has been able to collect more than twenty operations for medullary or retro-medullary tumors compressing the cord. In the intra-medullary tumors there are not sufficient data upon which to base conclusions. Of the extra-medullary tumors, cancer and aneurism are inoperable, and in these cases, as well as in diffuse intra-dorsal lesions due to tuberculosis, the operation can only be exploratory. But in the greater number of cases the tumor is extra-medullary, and is easily removed.

Huber⁵¹ reports a case of sacro-coccygeal tumor in a child 3 weeks old. It was evidently a multilocular cyst starting from the coccyx, but no communication with the spinal canal was discovered. A small portion of the tumor, running toward the anal region, was, in consequence of the condition of the patient, left undisturbed. Five weeks later this portion was operated upon, and the main body of the growth was found to be of a different nature, of a firm consistency and apparently lipomatous in character, without any sharply-defined capsule. One cyst was found running posteriorly and laterally, involving the coccyx. The tumor was removed and the wound loosely packed with iodoform gauze. The child recovered. The tumor weighed 200 grammes (6½ ounces).

SURGERY OF THE NERVES.

Several operators claim priority in devising operations designed to reach and remove the Gasserian ganglion. One of these controversies has arisen between Andrews, of Chicago,⁶¹ and Rose, of London.²² The former has operated four times, twice with complete relief for over two years. The third case died of shock following the operation, and the fourth had just been operated upon at the time of the report. It is claimed that Andrews first performed his operation on the cadaver, while Rose, working independently and without any knowledge of Andrews's work, first operated upon a living subject.

Another controversy has been going on between Hartley⁹⁶ and Krouse.⁶⁹ The latter claims that he had performed his operation on the cadaver, even before Rose made his report to the Medical Society of London. It would seem that these investigators arrived at practically the same conclusions independently of one another, and that at the time of the publication of their results

they were not aware of any other similar work. The chief difference in the two operations seems to be that the latter removes the bone with the trephine and the cutting forceps, while the former uses the chisel and makes a flap composed of both soft parts and bone. Hartley ², reports five cases operated upon by this method. Krouse reports ⁹⁶ _{Sept.} that he has operated five times. In two, on account of haemorrhage, the operation was performed in two sittings. Rose ¹⁰⁷⁷ _{May}, has operated seven times, in all but one with success, and Park ⁹ _{July} three times.

D'Antona ⁵⁸⁹ suggests the following modifications of Rose's operation: Incision, one centimetre behind and two centimetres above the orbito-temporal process. This incision runs vertically to the inferior margin of the zygoma; then horizontally one centimetre below and parallel to the arch, to within one centimetre of the temporo-maxillary articulation; then vertically again for three centimetres. This flap is turned back, the zygomatic arch resected and turned down, the coronoid process laid bare, resected at its base, and turned upward with the temporal muscle; the pterygoid muscle is cut, the inferior surface of the great ring of the sphenoid is detached, and the foramen ovale laid bare. The sphenoid cavity is trephined, the dura detached over the trephine-opening, and the second and third branches of the trigeminal are extracted, the inferior anterior portion of the ganglion being pulled away. The author has operated successfully upon one case.

Van Heuverswyn ²²⁰ _{Oct. 1892} successfully treated a case of trigeminal neuralgia by the Lossen-Braun-Ségond method. Schnitzler ⁸³⁶ _{Nov. 26, 1892} employed Krönlein's method, with a satisfactory result.

Lanphear ⁷⁷ _{Nov. 1892} has operated after the method of Rose, the patient remaining free from pain over a year. Doyen ¹⁴ _{Apr. 18} has also removed the ganglion with success, and, in consequence, suggests the possibility of intra-rachidian section of the posterior nerve-roots in cases of inveterate neuralgia of the spinal nerves, apparently ignorant of the work already done in this direction by Powers. Sachs ¹⁰⁷⁵ says that, in regard to surgical treatment of trigeminal neuralgia, he would plead in every case for nerve-excision as a most radical method, or nerve-excision combined with nerve-avulsion.

Krönlein ² _{Jan. 14} suggests, in order to expose the inferior division of the fifth nerve at the foramen ovale, that an incision be made

from the angle of the mouth to the tip of the ear, without cutting through the buccinator muscle and mucous membrane of the cheek. The masseter muscle is separated from the parotid, which, together with its duct, is left undisturbed. The coronoid process is freed and divided obliquely with bone-forceps, and then lifted up with the temporal muscle. The fat is next cleared away from the cheek and the buccal nerve in its course between the internal and external pterygoid muscles, and the inferior dental and lingual nerves brought into view. In order to find the auriculo-temporal nerve the external pterygoid muscle is raised and the internal maxillary artery double-ligated and divided, when the auriculo-temporal nerve, with the middle meningeal artery between its branches, is seen; and the individual branches of the inferior division of the fifth nerve may be divided at the base of the skull or pulled out.

Chicken⁶ says that he has failed to find any operation for neurectomy of the second division of the fifth nerve which fulfills all the essential conditions, *i.e.*: 1. A well-exposed situation for incision. 2. Non-implication of important structures or organs, such as the orbit or eyeball. 3. Good anatomical landmarks. 4. Avoidance of bleeding or oozing. 5. Free access to the nerve-trunk. 6. Practicability of removal close to the foramen rotundum. 7. The least possible disfigurement or loss of function afterward.

Stoker² advocates operation on the fifth nerve in those extreme cases of epileptiform tic which fail to yield to other treatment. He exhibited two instruments which he had devised to facilitate the removal of the infra-orbital nerve by Wagner's method,—one a retractor, to lift the periosteum and contents of the orbit; the other an instrument to free the nerve from its relations.

Bennett¹⁰⁷⁷ reports three cases, one of infra-orbital and two of inferior dental avulsions. Goris, of Brussels,⁶⁸⁰ also succeeded in overcoming an obstinate neuralgia of the ala nasi by elongation and resection of the infra-orbital nerve. The patient remained well for seven months. Atkin² operated on a man in practically the same way as Bennett.

Morton,¹¹² in a man in whom D. Hayes Agnew had trephined the antrum, removing the second division of the fifth nerve, and in whom the pain had recurred after a time, found that the

nerve had regenerated. It was again evulsed. For a few days the pain increased in severity, and then was much relieved.

Lange¹,_{Feb. 4} showed to the New York Surgical Society two specimens of nerves taken from two old men (one 60 years old and the other 70) by Thiersch's method and forceps. The first specimen had been from the third division of the fifth nerve, and the second, a part of the second branch, was taken from just below the foramen rotundum. In both cases the neuralgia had been cured.

Deaver¹¹⁹,_{May 15} operated on a patient who had recurrence of pain after two evulsions of the inferior dental nerve. The whole field of operation was opened up again, another portion of the proximal end was excised each time and all of the distal portion as far as the mental foramen, and the last time the gustatory nerve was also excised. This was followed by relief.

Schulze-Berge²²⁸,_{B. 19, H. 1, Aug. 12},² reports a case of severe trigeminal neuralgia successfully treated by exposure and stretching of the facial nerve. Heinlein³³⁶,_{Dec. 10, '12} reports a case in which he successfully resected the genito-crural nerve. Morpergo¹³,_{June 15} has made a careful experimental study, upon rabbits, as to the result of excision of the sciatic nerve.

Bircher³³⁸,_{X. 25, July 15},² reports a case of neuropathic œdema of the left upper extremity of a woman aged 39 years. The good results which followed exposure and stretching of the ulnar nerve at the end of the twelfth month led the author to perform a similar operation on all the cords of the brachial plexus below the clavicle. This treatment was followed by decided but slowly-developed improvement, and after an interval of four months the whole limb was restored to its normal size and functional activity.

At Rashmir Hospital²³⁹,_{Apr. 16} nerve-stretching still continues to be the treatment adopted in the early stage of anæsthetic leprosy, and the operation during this year was extended to two cases of sciatica with very good results. Calvo¹⁰⁰⁶,_{June} says that nerve-stretching is indicated in mixed neuritis, which does not yield to therapeutic agents. The operation is simple, should heal by first intention, but should not be performed until all other means have failed. Complete cure does not always follow; sometimes there is only slight amelioration, and sometimes rupture or confirmed neuralgia may result. Complications are rare, unless myelitis is present.

The specific action can only be explained by the effect of the operation upon the nerve-centres.

The presentation of a case of suture of the median nerve to the French Academy of Medicine by Berger¹⁰, started an interesting discussion on the method of the restoration of function in severed nerves. Brown-Séquard, Laborde,¹⁰ Herzen,⁵⁵ and Hodge⁹ have all taken sides either for or against direct reunion of the severed nerve-fibres. The balance of opinion seems to be that the placing of the severed ends in juxtaposition simply assists the process of regeneration by preventing the formation of a cicatricial mass between the severed nerve-ends, which would prevent the new granulation tissue starting from the distal end reaching

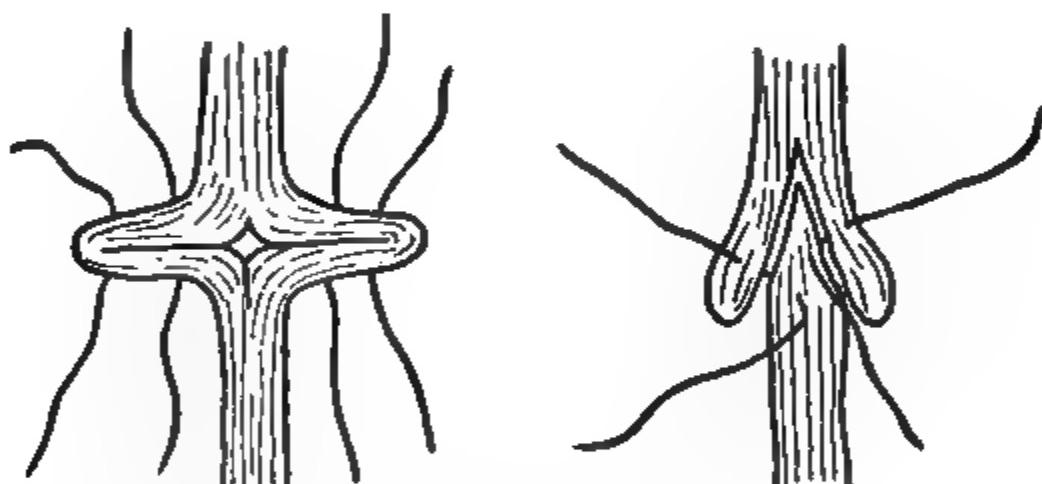


FIG. 1.

FIG. 2.

FIG. 3.

SUTURE OF NERVES. (GLEISS.)

Fig. 1, longitudinal incision through epineurium, extending into normal nerve-substance on either side; Fig. 2, incision in Fig. 1 united transversely. Fig. 3, nerve-stumps united by the wedge method.

American Medico-Surgical Bulletin.

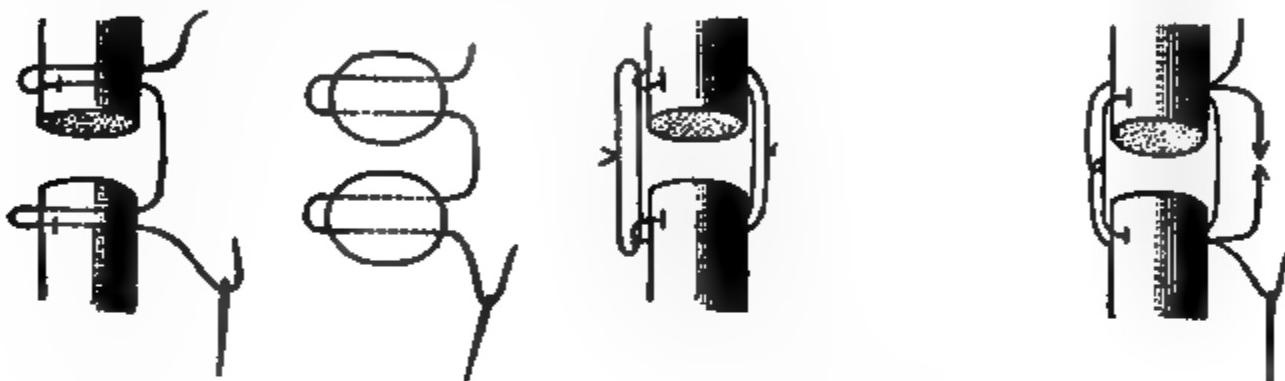
and occupying the sheath of the proximal end. The only portion of the proximal end that does not degenerate is the sheath of Schwann, and it is by this new tissue growing from the distal portion that the gradual recuperation is explained. Unfortunately, this does not explain the cases where the restoration of function is immediate, and therefore some of the observers claim that both methods may exist,—the regeneration of all the fibres in the proximal end when the suture is tardy, and immediate union in those cases where the nerve-ends are brought into immediate apposition.

Heath⁶ and Moullin⁶ each report a case of nerve-grafting. The former employed two inches and a half of the posterior tibial nerve of an amputated limb to fill in the gap in the ulnar nerve.

Two months later there had been no return of function. In the latter case the sciatic nerve of a young retriever was employed to unite the severed ends of the musculo-spiral nerve, but there was only a very slight recovery of function.

Gleiss⁸¹⁴ has reported eleven cases of nerve-suture in which all but one were completely cured. In cases where it was necessary to freshen the ends, the methods indicated in the cuts on preceding page were employed.

Mann⁸¹⁴ resected enough of the humerus to enable him to



METHODS FOR THE SEPARATION OF SEVERED NERVE-ENDS. (TRNKA.)
Centralblatt für Chirurgie.

bring the severed ends of the musculo-spiral nerve into apposition. Trnka,⁸⁸⁶ in repairing severed ends of nerves and tendons, devised a method of operating indicated in the accompanying figures.

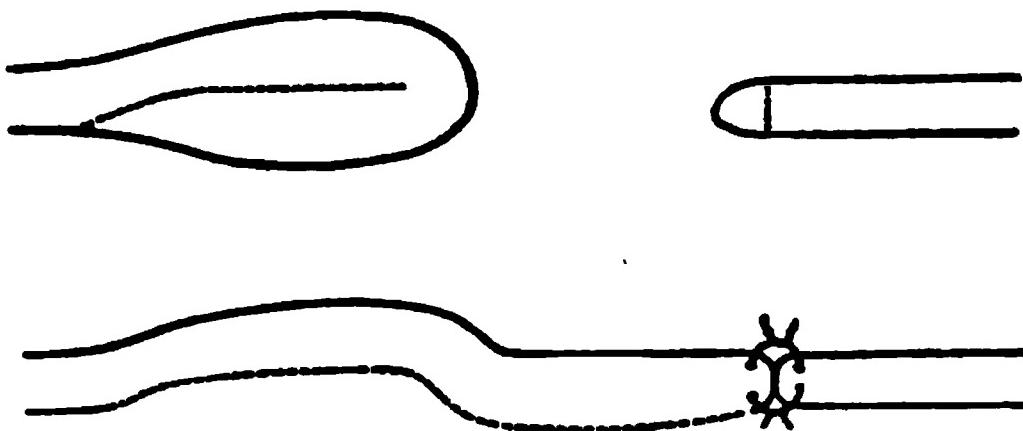
Duncan, ¹⁰⁷⁷ Lillenthal, ⁶ Heath, ⁶ Beale, ²² McCarty, ⁸⁰ Artaud, ²¹¹ and Ozoux ¹⁶⁸ all report cases where the median or median and ulnar nerves were injured by incised wounds and were sutured. All these cases recovered. In Duncan's case the two ends could not be brought together without too much tension; so, after freshening the lower end, the bulbous portion of the upper end was split down the greater part of the way and sutured down to be united to the lower end, as in the figures on next page.

Tornu⁹²⁵ has made a study of the anastomosis between the cubital and median nerves in the palm of the hand, and finds that it is nearly always constant. Openshaw¹⁰⁷⁷ and Wright¹⁵⁷ report cases of successful suture, and Cunningham, ² Smith, Tronson and Holden, ² all report cases of dislocation of the ulnar nerves at the elbow. Smith operated in his case, and fixed the nerves in place by catgut sutures.

Ehrmann¹⁶⁸ and Guelliot⁸¹⁴ both report cases of suture of the radial nerve. In the former there was considerable, though not a complete, restoration of function, and in the latter the separation of the ends was as much as eight and one-half centimetres. The two ends of the nerve were introduced into a tube of decalcified bone, and the ends were also united by a thick strand of catgut. Five months later sensation had returned, but the paralysis continued.

Féré and Schmid⁸⁸⁵ report four cases of elongation of nerves in spasmodic infantile hemiplegia with epilepsy, and conclude that, while this operation may be indicated for the relief of pain in contractured limbs, it has no effect upon athetotic or epileptic convulsions.

Graham⁹ says that in the past eight years he has seen and



SUTURE OF NERVES. (DUNCAN.)

The upper figures indicate the position before suture, the lower figure after suture. The dotted lines indicate the incision.

Clinical Journal.

noted fourteen cases of neuralgia of the base of the fourth toe, or Morton's painful affection of the foot. Nine of his fourteen cases were cured or materially relieved by properly-constructed shoes, with broad soles and sufficiently long not to cramp the toes. Relief has also been obtained by separating the toes by pledgets of cotton and by the use of liniments. In one aggravated case the toe and a portion of the metatarsal bone were removed. He reports four cases in detail in which the nerve was resected, and he now believes that to be the preferable mode of treatment. The removal of the toe and part of its metatarsal bone, or a resection by Morton's method, leaves some degree of deformity, which is an objection. The resection of large tracts of nerves at points remote from the seat of pain is not at all necessary, and, so far as tried, is not satisfactory. None of these objections can be urged against the removal of the diseased or painful portion of the nerve.

THORACIC SURGERY.

By J. McFADDEN GASTON, M.D.,

ASSISTED BY

J. McFADDEN GASTON, JR., A.M., M.D.,

ATLANTA.

GENERAL CONSIDERATIONS.

IT seems to be generally accepted by medical writers that children are more easily cured of chest diseases than adults ; that they are often cured spontaneously, but if operative measures are required they undergo them with less shock. Drainage is insisted on by Pitts,² but Steele¹⁹ and others think that too long a time is consumed in securing it, and that the drainage-tube, if used, should be removed early, while gauze is to be preferred.

Even the mode of dealing with wounds of the parietes of the chest is a mooted point. While the weight of authority is favorable to closing incised or gunshot wounds of the walls of the thorax, there are advocates for laying open freely all the parietal structures in traumatic injuries of the chest-walls attended with internal haemorrhage. There appears to be a reaction in favor of medication, blood-letting, and blisters in serous pleural effusions, and against early aspiration. The following general inferences may be drawn upon the present status of the subject⁶¹ :—

1. All penetrating wounds of the thorax may be closed hermetically, by suture or otherwise, after allowing the discharge of fluid blood from the opening.
2. Foreign bodies lodged in the bronchi may be removed by incision of the trachea at the lowest available point.
3. Experiments for reaching the bronchi through the chest-wall afford little encouragement for operation upon the human subject.
4. Medication as a preventive and a curative agency in pleuritic effusion is worthy of trial, before having recourse to aspiration.
5. Aspiration is indicated when there are large serous accumulations in the chest and likewise in pneumothorax, but cannot be relied upon for the relief of purulent collec-

tions. 6. Partial resection of ribs is attended with better results in some cases of empyema than the complete removal of the segments of several ribs. 7. The excision of a small portion of one rib with the introduction of drainage-tubes has been generally attended with good results. 8. Washing out the cavity of the chest is not requisite, except in contamination and decomposition of the contents. 9. The operation of thoracotomy for abscess and gangrene of the lung should be accompanied with antiseptic applications and with tamponage gauze. 10. Tumors of the mediastinum may admit of interference, but further developments are requisite.

WOUNDS OF THE THORACIC WALL.

"Gunshot Wounds of the Chest" was the title of a paper by Charles Adams before the Association of Military Surgeons of the United States.⁶¹ Aug. 19 He considers that, whereas we still have the same proportion of wounds to the chest as formerly, compared to wounds of other parts of the body, we now have forty-five fewer deaths in every hundred. He considers the ideal treatment to be primary aseptic or antiseptic occlusion in non-penetrating wounds. Most penetrating wounds of the chest are complicated by wounds of the contained viscera. He advises the hypodermatic use of morphia, ergotin, and digitalis.

A case of gunshot wound of one lung, reported by Bickle, of Mt. Bark, S. A.,⁸¹⁴ shows the remarkable vitality of the young in recovering from thoracic wounds. A boy of 16 was accidentally shot in the back at a distance of only a few feet. His condition was very serious. Ether, brandy, and ammonia were given to counteract the shock, with small doses of morphine frequently, a calomel purge, and vini antimonii tart. 5 minims (0.32 gramme) every second hour alternately with the morphine. Resection of rib, drainage-tubes, no washing out, and a dressing of salicylic wool, iodoform, and vaselin were resorted to seventy days after the injury, for empyema. A gunshot wound was the cause of empyema in a case reported by N. T. Dulaney, of Bristol, Tenn.⁸¹ The points of interest in the case are the following: 1. The lung itself seemed to have undergone degeneration, and portions escaped with pieces of pleura when a detached spicule of rib was removed forty days after the wound was received. 2. The complete cure of the patient by means of enemas, which passed out through the open-

ing that had been made by the ball ; also the use of carbolized water in the tract of the ball, iodoform gauze, and the final removal of ball. A gunshot wound, involving both thorax and abdominal cavity, was reported by J. S. Wright,¹⁵⁷ in a girl aged 4. An incision was made at the entrance of the pistol-ball, and, the rib being perforated, was resected at that point. The ball was traced through the edge of the left lung, the diaphragm, into the abdomen ; but as no blood or wound in the abdominal viscera was perceptible, a drainage-tube was put into the abdominal cavity and another into the lung, the external ends stitched to the integument, and the external wound sutured. The patient finally recovered. Three cases of death from the protrusion of abdominal viscera through a wound in the diaphragm⁹¹, show the importance of closing up any extensive wounds involving both cavities. In the first case the patient died on the sixth day from a peritonitis, and the post-mortem showed that the ball had traversed the right lung, the stomach, and was imbedded in the liver. In the second case, a year after the sword-thrust, in the post-mortem, the stomach and duodenum were found in the thoracic cavity. In the third, an effort was made on the following day to save the patient by reducing a hernia of stomach and suturing the wounds, but it was too late.

Incised and Lacerated Wounds.—Hagentorn²¹, reported before the Association of St. Petersburg Physicians, April 13, 1893, three cases of wounds inflicted by a hatchet in the thoracic wall. One patient died in consequence of the wound ; the other two recovered. Besides other wounds, one case had a penetrating wound of the left side six inches in length. In the second four ribs were cut through. Portions of lung were protruding. The ends of the ribs were united and the outer wound sutured. Drainage-tubes were used. Recovery ensued. Another case, in an old woman, also ended in recovery. The autopsy of the other case showed extensive adhesions, hæmatothorax, and septic trouble.

E. Massart, of Honfleur, France,⁶, records a case of traumatic hernia of the lung in a robust, healthy man, 38 years of age, as the result of a stab wound in the seventh left intercostal space, a little behind the anterior axillary line. The protruding lung formed a swelling in the wound half the size of a hen's egg ; it was smooth, of a rosy color, irreducible, crepitating under the finger, and not altered in size by the movements of respiration.

The wound had occurred fourteen hours before seen, and the patient complained of severe pain in the part, and his respiration was short, rapid, and embarrassed. The base of the tumor was transfixated with a needle carrying a double strand of catgut, with which it was tied in two pieces. The projecting mass was then cut away and the stump was reduced into the pleural cavity. The external wound was closed and rigid antiseptic treatment carried out. The man made an excellent recovery, without either pleurisy or pneumonia. A similar case to this is reported by Agramonte.⁶

J. E. Bocano, of Hyderabad,²³⁹ reports a case of penetrating wound of the pericardium, with recovery. A man, aged 42, was gored by an ox in the chest. The wound was situated in front of the chest, some two inches to the left of the lower third of the middle piece of the sternum. A triangular flap of integument, measuring about two inches at the free margins and two and a half inches at its base, was reflected upward and outward in the direction of the left shoulder, exposing a deep wound, which involved the soft tissues, the cartilage of the fifth rib, the pleura, and opened into the cavity of the pericardium. It admitted of a good view of the whole apex of the heart as it beat in its pericardial sac. The lips of the wound were hermetically sealed with small pieces of lint saturated with Friar's balsam, and over this was placed a "protector," well soaked in carbolic oil, with a padding of cotton and a bandage. The dressings were not removed until the eighth day, when the wound was perfectly healed by first intention.

A punctured wound of the chest with hernia of the lung was followed by recovery in the practice of W. J. Montgomery, Buldana, Berar.²³⁹ Four wounds were made by a dying boar in the scapular region of a boy of 15 years. A 5-per-cent. boric-acid solution was used, and, the portion of lung being pushed back, the wounds were sutured. Recovery followed in twenty-two days.

Stab Wounds.—A stab wound of the right lung with recovery was detected over a month after it was inflicted, by Collins, of Williamsport, Tenn.¹²⁰ There were other cuts demanding sutures, about the face, but a stab on the back of the right shoulder was dressed with a compress. Considerable hæmorrhage arising from this wound, it was finally opened, washed out with a hot bichloride solution, and from 20 to 30 ounces (625 to 930 grammes) of de-

composed blood removed from the pleural cavity, which was packed with iodoform gauze. An anæsthetic was used.

Two cases of stab wound of the heart are described by Marks, of St. Louis.³⁶⁴ Speedy death occurred in the first case, the stab involving the right ventricles. The recovery of the other was accomplished in twenty-one days, after a stab that penetrated the left ninth intercostal space, the diaphragm, the pleura, the pericardium, and the apex of the heart (see cut). It was necessary to enlarge

STAB WOUND OF THE HEART. (MARKS.)
Medical Fornightly.

the wound to more than the size of the cut received by the one that died; and yet, with rigid antiseptic precautions, the patient survived. Under an anæsthetic, packing with iodoform gauze was resorted to after removal of one and a half inches each of the ninth and tenth ribs.

A similar case to that of Montgomery is reported by J. Fred Alexander, of Cherokee, Ala.,¹²⁰ where a stab wound in each lung in the scapular region was followed by rapid recovery. He used

drainage-tubes after irrigation with bichloride-of-mercury solution. A penetrating wound of the lung with immediate collapse also ended in complete recovery in a short time (twelve days) in the hands of Brown, of Cooch Behar, India.²³⁹ The wound was in the back, in the identical position described by Alexander, but involved only one lung, and was the result of a spear thrust.

The complications of thoracic wounds—hydrothorax, pneumothorax, and hæmorthorax—have been quite frequent. Casazza¹¹⁰² had to evacuate quite a quantity of blood that had accumulated after a wound in the fourth intercostal space from a plow-handle. A marked improvement and recovery, as usual, followed the evacuation. Cleaveland, of Biggs, Cal.,¹⁴⁷ reports that a case of penetrating wound of chest by metallic cartridge, involving lung in a child, was followed by empyema. Drainage and complete recovery. Michaux³⁷⁸ has been able in three instances to examine minutely and easily the thorax by means of a double opening in the chest-wall. My prediction before the Medical Association of Georgia, in April, 1893, has been realized in the "trap-door" of the chest made by Delorme, of Paris.²² An officer had stabbed himself in four places through the chest with a large double-edged knife. After the usual occlusion Delorme saw that his patient would die, and decided to resort to an exploratory operation to detect, and, if possible, correct the cause of syncope. He found that some arteries in the lung-substance were bleeding profusely. He also found a fourth wound in the pericardium. He closed these by hæmostatic forceps, packed with iodoform, and sutured the external wound. Death in fifteen minutes. The process described by Delorme consists essentially in the formation of a flap from the soft parts of the thoracic wall and the ribs, which, when retracted, affords wide access to the field of operation. After the completion of the operation the flap is replaced and sutured to the thoracic wall. The flap is formed as follows: An incision, representing the three sides of a rectangle, is made in the region between the third and sixth ribs. The base of the flap, thus formed, is directed posteriorly and above, and its upper and lower margins run parallel with the ribs, and extend from the axillary border of the scapula to within two fingers' breadth of the sternum. At the anterior margin of this flap the ribs and intercostal muscles are severed, while at the posterior

margin only the ribs are divided to a limited extent. The flap is then loosened at its upper and lower margins and thrown back. This operation has been employed by Delorme in tuberculous abscess of the chest-wall, which perforated into the thoracic cavity.

MEDIASTINAL TUMORS.

Demantké⁷ found in post-mortem examination a mediastinal tumor in a male patient, aged 26, who had had pleurisy two years previously, but had not been inconvenienced by his disease until two months before his death, when his face and limbs became œdematosus and he stopped work. The tumor weighed 2150 grammes ($68\frac{3}{4}$ ounces), and was mostly confined to the right side behind the heart, extending above the clavicle. It pressed upon the superior vena cava.

A. Sokolowski⁵²⁰ found, in a patient 52 years old, (1) extended dullness over the sternum, as well as on the right side of the chest; (2) greatly-enlarged glands over the right collar-bone; (3) contraction of the right pupil; (4) swelling, principally of the right side of the body; (5) considerable dilatation of the veins of the chest and abdomen. These symptoms, together with dyspnoea, difficult swallowing, and gradual marasmus, aided in diagnosing a tumor of the mediastinum, which was demonstrated by autopsy. Microscopical examination proved the tumor to be a malignant sarcoma of the lymphatic glands. By exploratory puncture in the third right intercostal space pus was liberated, and autopsy proved that it came from one of the numerous bronchiectases in the right lung, the contents of which could not be evacuated on account of pressure produced on bronchi by secondary tumors disseminated in the lung. (Report of Corr. Editor Drzewiecki, Warsaw.)

These symptoms are much the same as those in Demantké's case, with the exception that the pupils were not unequally dilated, and that the œdema seemed to be more in the upper part of the body than in the lower. The eyelids were especially œdematosus, and finally permanently closed the eyes. A purulent collection was found in the left pleural cavity.

CYSTS OF THE LUNG.

Delagénière, of Mans, France,⁸ reports a successful case of excision of an hydatid cyst. A large opening in the chest-

wall was made, and a portion of the sixth, seventh, and eighth ribs was resected; the cyst was then easily stripped away. The patient was a woman, aged 36, who had felt a pain in her side for some time, which disappeared for two years, returning in 1892. There were pleural effusion, dyspnoea, and supposed urticaria. Delagénière made an exploratory puncture, and a transparent, greenish liquid was removed. An attempt was made to remove this fluid without an excision of a portion of the ribs, but the flocculent masses were too large.

Berger, in discussing this case, reported one of his own, in which the result was not so fortunate. A woman who had previously had symptoms of pleurisy was seized with nausea and vomiting. Berger punctured the thoracic cavity and removed some purulent liquid for the second time, when he penetrated into a collection which could only be evacuated by an incision of two centimetres, as the pleura was thickened and the lung-tissue itself was hardened. Numerous small cysts escaped. Another cavity filled with hydatids was found. In order to wash out the cysts a boric-acid solution was carefully injected, but the patient died of suffocation before the operation was completed.

Hydatid of the pericardium, lungs, and liver, requiring two evacuations with the use of drainage-tubes, and finally aspiration, is reported by R. G. MacDonald.⁵⁵⁷ The patient, male, aged 35, single, shepherd, had indications of tubercle in both lungs, which were found in the post-mortem. The case had been deemed hopeless on this account, and no incision seems to have been made. A fetid cyst communicated with the bronchial tube in the infra-axillary region, and another was drained in the infra-clavicular region of the left lung. Aspiration was done in another over the apex of the heart.

Another case of hydatid cyst of the lung, in a boy aged 7, is described by Arthur Miers, of Coonabarabran, N. S. W.²⁶⁷ This also ruptured into a bronchus, but was on the right side, where a year before the boy had had pleurisy, or, at least, supposedly so. The right side of the chest was larger than the left, and immovable on respiration. Miers took the case to be one of pleuritic effusion, and performed thoracentesis with an aspirator for exploration, removing in this way 8 ounces (248 grammes) of clear fluid. The rest of the fluid was coughed up and showed,

upon microscopic examination, numerous hooklets and scolices. The specific gravity was 1007, and the fluid contained no albumen. The patient experienced immediate relief from dyspnœa, and was well in a month.

F. W. King, of Auckland, reports a case of bronchocele containing fluid, which rapidly collected and interfered with breathing.⁵⁵⁷ King introduced an ordinary hydrocele trocar and cannula, and removed about 8 ounces (250 grammes) of clear, alkaline fluid, having a specific gravity of 1015 and coagulating on boiling and on standing. The swelling disappeared and breathing became quite natural. In a fortnight, when the tapping was repeated, the fluid removed was dark and grumous. The next two tappings were accompanied by injections of glycerin, tincture of iron, and glycerin and tincture of iodine, and a drainage-tube. This caused the cavity to disappear and no more fluid to collect.

PERICARDIAL EFFUSION.

Wilson, of Nashville, Tenn.,⁵⁵⁸ has practiced, as he supposes, for the second time, paracentesis of the pericardium through the fifth right intercostal space. His patient was a man aged 36, had pericarditis, with effusion, complicating acute Bright's disease. Symptoms very distressing; apex-beat imperceptible; area of absolute dullness extending from one inch external to left nipple to two inches beyond right border of sternum, and between the upper borders of the third and sixth ribs. An ordinary aspirating needle was used twice in this way, each time, with immediate relief of the severe symptoms, evacuating 15 to 20 ounces (465 to 620 grammes) of serous fluid.

West in 1883 referred to seventy-nine cases with thirty-six recoveries. He stated that paracentesis is a justifiable operation, and that it can be done without any great danger; that the best point of puncture is the fifth intercostal space, an inch from the left border of the sternum. But Wilson's case was an inch from the right border of the sternum. R. Siewers, of Helsingfors, Finland,⁵⁵⁹ in reporting nine cases, concludes as follows: 1. Incision with drainage, in purulent pericarditis, is fully justifiable, and is the only means of saving the patient's life. Its performance does not disturb the heart's action. 2. In many cases operation may bring about complete recovery—four out of nine cases. In pyæmic

infection it relieves the patient and prolongs life. 3. The operation should be done in the fourth or fifth intercostal space, two centimetres to the left of the sternum. Drainage is necessary. Irrigation should not be done.

MEDIASTINO-PERICARDITIS. (EDWARDS.)

1, anterior mediastinal tissues greatly thickened; 2, left lobe of liver; 3, stomach; 4, spleen (adherent to fragments of the diaphragm and all bound together in one mass); 5, the heart, with its cavities laid open, *in situ*; 6, pyo-pericardium; 7, left lung; 8, ampyematos cavities, with sacculated per-cavities at 9, 10, and 11; 12, thickened pericardium.

International Medical Magazine.

Audeoud¹⁹⁷ reports a case of pericarditis of an haemorrhagic nature which occurred in the course of tuberculous peritonitis. Paracentesis of the pericardium was followed by complete closure.

Death occurred three months afterward, and, on the post-mortem examination, was thought to be due to a tuberculous state of the abdominal viscera, which were perforated and allowed the escape of faecal matter, setting up peritonitis. The heart had regained almost a normal appearance.

William A. Edwards, of San Diego, Cal.,⁴⁵¹ gives the history and post-mortem of a case of mediastino-pericarditis in a child of 6 years. There were three operations performed, seeming to give relief, but the patient died within a week after the last operation. Within two months the primary mediastino-pericarditis was followed by a purulent pleurisy. The child complained, at first, of a constant pain, with marked exacerbations over the left costo-sternal region, extending from about the mid-sternal line to a little below the costo-xiphoid angle; over this region it was thought that there was some impairment of the normal percussion resonance, although this alteration was not marked. The cervical veins were distended, the action of the heart tumultuous and irregular, while the temperature was $1\frac{1}{2}$ degrees above normal. The dullness extended toward the left axillary line. The temperature, pulse, and respiration all became ominous, and an exploratory puncture was made with an aspirating needle at a point a quarter of an inch within and above the position of the normal apex-beat of the heart. Ether was used and an incision made, 9 ounces (280 grammes) of pus removed, and a rubber drain inserted. Another operation was made in a fortnight, as the temperature had risen to 105° F. (40.6° C.). An incision was made in the eighth space, at the post-axillary line, and 16 ounces (500 grammes) of pus evacuated. A rubber tube was inserted as before. Finally the resection of three ribs was performed, as the cavity seemed to decrease very little. The child reacted nicely after the operation, but the suppuration had progressed too far. The post-mortem, held six hours after death, showed that the right pleura, both visceral and reflected, was covered with recent lymph, which was also intra-lobular. The mediastinal space held new-formed connective tissue with the heart imbedded in it. The pericardium was adherent to the heart, and showed a puncture from the first operation, which had rendered it thick. The left lobe of the liver, the diaphragm, and the pericardium were all adherent. The stomach, spleen, pancreas, and left lobe of the liver were matted together. The kidneys were in

a condition of chronic parenchymatous inflammation. By reference to the figure on page B-10 these points will be clearly seen.

PNEUMO- AND HYDRO- THORAX.

Coupland and Gould ¹⁰⁷⁷ describe the case of a young man, aged 25, who, after a previous good history, became spare, pallid, and suffered from pleuritic effusion. He underwent thoracentesis, and, later on, in the same position, about the fifth space in the axilla, resection of a portion of rib. A large quantity of air escaped on opening the pleura, with about 50 ounces (1560 grammes) of clear, serous fluid. The heart, which had been pressed over to the right side, now regained its position and the lung expanded, but for lack of drainage a re-accumulation occurred. Death took place from tubercular deposit. Vickery ⁹⁹ adduces authority to show that nine-tenths of all cases of pneumothorax are tubercular, and explains that the tubercular infiltrations, breaking down, open a communication between the bronchi and the pleural cavity. The next most common cause is empyema, ulcerating into the lung. In addition to these, which may exist for some time and yet not develop pneumothorax, he mentions violent exertion, also regarded as a cause by Coupland, ¹⁰⁷⁷ who reports a case which occurred simply from a hasty walk. Coupland divides pneumothorax into traumatic and morbid.

A case of tuberculous pyo-pneumothorax is reported by Brunet ¹⁸⁸, in a man, aged 28, who underwent thoracentesis several times, and who was thus freed of considerable amount of pus, along with serous fluid. He calls attention to the following points of the case: 1. The slow evolution of this pleurisy, which was due at the beginning to a pleural tuberculosis, and, in all probability, nothing but pleural. 2. The transformation of the serous collection to a purulent collection. 3. The lowering of the liver by the weight of the liquid, causing congestion of that organ, with pain on palpation. The patient died before he could be treated.

Pneumothorax as a result of a fractured clavicle was observed by Harman and Vincent ⁵⁷ in a man, aged 30, who fell while jumping out of a carriage. On the following day he felt a difficulty of breathing and bled at the nose. Leeches were applied ten days after the fall. Quinine was used to bring down the temperature, but dullness in the lower third of the chest being com-

plete, and the temperature rising, Harman evacuated half a litre (1 pint) of rather purulent, reddish liquid from an opening in the eighth intercostal space, after which the temperature fell. Carbolized and boracic washes and drainage-tube completed the cure.

Ernest Rowell Watkins, of Nottingham, ⁶ has practiced paracentesis of the chest in cases of pulsating pleurisy and pneumothorax with good effect. In the case of a girl, 18 years old, who had strained herself by lifting a box, there was a sensation of something having given way and pain in the side and back. After various measures of treatment, a distinct pulsation or heaving was noticed in the thoracic parietes, and the hand, when placed on the left side, was forcibly lifted at each pulsation. Ten ounces (310 grammes) of pus were removed from below the inferior angle of the left scapula and a drainage-tube inserted, with ultimate complete relief. Another case, a clerk aged 26, had "wrenched his insides," and the pains were referred to the left side. Signs of great intra-thoracic pressure followed, and the left side was distended, with the heart pressed over to the right. The chest was punctured and a quantity of air came away with 12 ounces (373 grammes) of fluid. From this time the patient improved, and the breath-sounds could be distinctly heard back and front.

Cases of renal and cardiac hydrothorax are reported by Dantzac, ¹⁸⁸ in which he claims that thoracentesis afforded prompt relief. He attributes recovery in two cases to this procedure. The first case was double hydrothorax due to heart trouble, and accompanied by inability to breathe except in an upright position. On each occasion when thoracentesis was performed the dyspnœa ceased immediately, and the man survived an entire year. The second case presented ascites with double hydrothorax, followed by uræmic coma. The puncture of the chest was followed by the same relief as in the other case, and the patient continued better for some months.

Gallet ²⁹⁰ condemns the surgical treatment of pulmonary tuberculosis, and objects to antiseptic washes or injections into the parenchyma of the lung, considering them not only useless but dangerous measures.

Jaccoud, ¹⁰⁰ in treating of the semeiology of pleurisy, refers to pleural adhesions and also to thoracentesis. He describes the region of Traube, of a semilunar shape on the lower part of

the left side of the chest, as the proper place to introduce a trocar, so as to avoid adhesions of the diaphragm, pleura, and abdominal cavity. He finds it above the fifth or sixth left costal cartilage, extending behind to the anterior extremity of the ninth or tenth rib. He considers that adhesions are avoided in the anterior portion of the thorax better than in any other part.

Two interesting cases of complete and rapid recovery from pneumothorax which seemed to be independent of tuberculosis are reported. Glaeser^{14, 15} had a case of uncertain origin without the existence of an exudation at any time. A man, aged 30, thin, pale, and cachectic, suffered with pains in both hands and knee-joints, moderate fever, fair pulse, and normal breathing, and was suddenly seized with breathlessness until his respiration was seventy-two per minute, temperature 104° F. (40° C.), but the pulse still good. A trocar, with tubing attached, being plunged into the pneumothorax, a large amount of gas was released under water. After this the alarming symptoms gradually subsided.

The fact that Saussier reported 81 cases of tubercular origin out of 131 cases, and that Biach reported 715 cases of like tubercular nature out of 918 cases, and only 5 from emphysema, caused A. Lezius²¹ to notice carefully the case of a well-developed man, aged 54, of good family history, though the patient, a physician, considered himself a subject of chronic phthisis, tubercular bacilli being found in the sputum, and a cough having persisted for ten years. He was suddenly attacked with breathlessness, his pulse going as high as 120 per minute. There was no pleural exudation. The case recovered from gradual absorption of the air, and the author regards the pneumothorax as being of an aseptic nature resulting from emphysematous lungs. Chelchowski, of Warsaw,^{520, 100} details the case of a man, aged 51, in whom the chest was tapped fifty-three times in the course of the last twelve months of his life. The man suffered from aortic insufficiency, with right-sided hydrothorax. From 2 to 2½ litres (2 to 2½ quarts) of serous fluid were removed on each occasion. The thoracentesis invariably afforded relief to the dyspnœa. Medical treatment was only beneficial at first, and consisted of large diuretic doses of calomel.

R. L. Hinton, of Prescott, Ark.,⁸⁰ quotes from Alphonse Guérin as follows: "If acute pleurisy were treated by blood-letting,

blisters, etc., according to the method of Laennec and his followers, there would scarcely be any occasion for the practice of thoracentesis." He indorses this practice after an experience of thirty-six years, with an average percentage of pneumonias and pleurisies, without having a single case requiring thoracentesis, while he has witnessed many such cases in the hands of other physicians who refused to adopt this heroic treatment. He is not, however, in favor of a reckless and indiscriminate use of these remedies, and carefully selects his cases. He states that he has never bled a case that did not recover, and they have usually been cases that were considered hopeless by consulting physicians. This practice was adopted generally in this country many years ago, and ought, no doubt, to be revived at the present time.

Henry D. Didama, of Onandago County, N. Y., in a paper read before the New York State Medical Association,¹, advised the use of anodynes and strapping of the chest while the pain was severe; quinine, iron, and strychnine if the patient was in poor condition; and aspiration after the acute symptoms had subsided and percussion indicated the presence of fluid, even if it did not exceed an estimated half-pint (250 grammes). No effort was made to leave a portion of the effusion to be removed by the absorbents. The fluid was easily, quickly, and safely removed without increasing the local inflammation, weakening the patient, or retarding recovery; it prevented carnification of the lung, and those tender adhesions which, in late aspiration, eventuated in deformity and haemorrhage into the pleural cavity; it prevented congestion of the lung and dilatation of the right ventricle; and in cases of tubercular pleuritis it tended to prevent or arrest general bacillary infection.

Sarony²¹² has employed antiseptic intra-pleural injections for the treatment of thickening of the pleura with marked benefit. He uses an injection of 20 grammes (5 drachms) of liquor of Van Swieten in acute pleurisy after performing thoracentesis. In sero-fibrinous pleurisies the same method has been attended with remarkably good results. In purulent and encysted pleurisies, and in cases where resolution or absorption cannot be expected, this form of injection is advised. Another injection has been employed, consisting of iodine 1 gramme (15 grains), iodide of potash 4 grammes (1 drachm), distilled water 35 grammes (9

drachms), which is used daily and continued for eight or ten days. But this is not attended with such satisfactory effects, in the arrest of the pleural trouble, as the injection of Van Swieten's liquor in quantities ranging from 5 to 35 grammes ($1\frac{1}{2}$ to 9 drachms).

EMPYEMA.

Ransohoff, of Cincinnati,¹²⁸ in reviewing the treatment of empyema, believes that aspiration should be limited to one or two trials, for empyemas of the meta-pneumonic type, as seen in children and adolescents. For all other cases, free incision and drainage is indicated. An empyema should never be allowed to grow old. After citing a case of mercurial poisoning from bichloride solution, which was not supposed to enter the cavity, but simply to receive the pus by siphonage, he states his preference for gauze packing. He objects to irrigation except for putrid forms. Siphonage, favorably commented on by Austrian writers, is done continuously by having an antiseptic solution at the bedside of the patient at night, and carrying about the solution in the day with the external end of the tube immersed therein, while the other end is inserted in the cannula used for tapping. French and German writers have not secured such good results from this method. In the hands of its originator, Bülau,⁵ no results are mentioned, but Aust had thirty-two cases that recovered. The statistics of seventy-one cases treated in this way give a mortality of only 5.07 per cent., but the sum-total has been 48 per cent.

I. C. Holst, of Christiana, Norway,^{369, 96} gives statistics of cases of empyema treated from 1874 to 1890. Twenty-three cases were irregularly distributed through seventeen years, with eleven recoveries and twelve not cured. The average duration of the disease before operation was, in the cases that recovered, 5.6 weeks; in one, 20 weeks. On the contrary, in those not cured by operation it was 11.5 weeks. The primary affection in 4 was pneumonia, in 4 pleuritis, and in 2 influenza. In 3 cases there was expectoration of a purulent sputa, all of which ended fatally, though 1 was operated on. As to complications among those operated on with success, in 1 there was pericarditis and in another erysipelas. In those unsuccessfully operated on, purulent pericarditis was noticed once; tuberculosis once; in 1 pleuritis appeared on the opposite side, and in 2 multilocular encapsulation.

Arnot Spence, of New York,⁷⁸⁶ claims that empyema can be efficiently and successfully treated without resection of the ribs, and that the operation of free incision into the pleural cavity, if done early, will always obviate any deformity of the chest. He reports two cases,—one in a child 2 years of age and the other in a man 30 years old. In the former a free opening was made into the left side of the chest, through the eighth intercostal space. A pint ($\frac{1}{2}$ litre) of pus was evacuated. A drainage-tube was introduced, the cavity washed out with 1-to-5000 bichloride solution, and then irrigated with warm water. The child was discharged cured on the thirty-eighth day. In the second case the opening was made in the eighth intercostal space, and 32 ounces (990 grammes) of pus were evacuated. A tube was introduced and the cavity irrigated with warm water. The treatment lasted one hundred and one days, when the patient was discharged cured, without any deformity.

C. G. Kenyon, of San Francisco,²⁰⁸² states that the best location for excision is the sixth and seventh ribs. A long incision is made over the rib, dividing the periosteum and separating it from the rib. After this, a curved periosteotome is passed under the rib, riving off and separating the periosteum from beneath the rib to the extent desired, when the rib can be divided by a strong pair of bone-forceps. The process is repeated over a second rib, the points of the pleura still remaining intact. An opening and counter-opening is made at each end of the wound, and a large drainage-tube inserted, thoroughly evacuating the purulent contents of the sac. This is followed by a thorough irrigation with a weak antiseptic solution, the side being encased with antiseptic gauze overlaid with cotton. The object of exsection is to allow the chest-wall to collapse.

Rudolph³¹⁹,_{17, 2},_{July 8}, lays special stress upon the fact that one loculus may be evacuated while another may be left. He gives an example of a pleural effusion in which the mediastinal empyema was not found until a post-mortem was made, although evacuation of 750 cubic centimetres ($1\frac{1}{2}$ pints) of pus had been made on the left side, where there was a purulent pericarditis and an endocarditis. Want of correspondence between the amount of the fluid and its extent, as shown by dullness, may lead to further trial for pus.

E. L. Shurly, of Detroit, Mich.,⁶¹ advocates artificial opening of pulmonary cavities, insertion of rubber tube, and injection of chlorine. He thinks that the treatment of empyema by the usual surgical means has failed for three reasons; (1) the use of the knife instead of the galvano-cautery or thermo-cautery for making the opening through the pleura and lung; (2) the injection of antiseptic solutions instead of antiseptic gases; (3) opening into a free pleural cavity instead of only when the visceral and costal pleurae are adherent. He considers chlorine gas better than any liquid, because it diffuses itself through every part and prevents further infection in caseous lungs. To quote Shurly's own words: "The particular points which I desire to urge upon your consideration are, first, those made by Poirier and Jonnesco, viz., to open the cavity freely near the apex *without resecting ribs*, and to use the galvano-cautery knife for opening through the lung-tissue; and, second, the use of chlorine, ozone, bromine, or some other antiseptic gas instead of a fluid for the local medication; for the latter, it seems obvious, cannot be well tolerated by even diseased lung-tissue outside of the cavity itself, whereas with the use of a *gas* which is tolerable and capable of diffusion we may hope to reach remotely-diseased portions of lung which are in process of breaking down, as well as to render the caseous material in and about the excavation more or less incapable of producing further infection. Another point is the question of adhesion between the two pleural layers. It is plain that if the costal and visceral layers are not adherent it is inadvisable to proceed farther with the incision. Now, whether the directions promulgated by Poirier and Jonnesco are infallible guides in all cases remains to be seen. However, I think that in the majority of instances all doubt will be dispelled by the insertion of a clean needle and the observation as to the mobility of its free end."

Laplace, of Philadelphia, in the discussion of this paper, said: "I had a case of empyema from which I removed nearly a half-gallon (2000 grammes) of pus, removed with a curette as much as I could of a thick pyogenic membrane, and packed the cavity tightly with a quantity of sterilized gauze. That man never felt better in his life than he did after that operation. In regard to tumors of the mediastinum: About a month ago in Philadelphia a man came under my care who had an enormous tumor over the

sternum. It was impossible to make out the nature of it, and I determined upon making an exploration. This revealed it to be of a tuberculous appearance, and I scraped away at it, until there was a cavity as large as my fist, into which I could put my hand and rest it upon the pericardium. I had in that case a tuberculous condition of the mediastinum—what might have been elsewhere in the body a cold abscess. I packed that cavity likewise as in the previous case, with a good result, and shall ultimately perform a plastic operation for the restoration of the part lost."

Sir William Stokes, of Dublin, ²² gives an account of his experience with Estlander's operation. In one case the patient recovered, but afterward died from diarrhœa. In the second case the operation was performed as follows: The ribs were exposed by a lunated incision, the centre of which was crossed by the mid-axillary line, about three inches behind a previous opening. The flap was then dissected back and the ribs were found so closely approximated as almost to obliterate the intercostal spaces. Portions of four ribs were excised by a fine saw and bone-forceps, the pieces averaging one and a quarter inches in length, the periosteum having been previously removed by Ollier's raspatory. A large quantity of pus was then evacuated and the cavity thoroughly flushed with a warm boric solution. A full-sized drainage-tube was then inserted into the cavity. Silk sutures were used to stitch the edges. He prefers boric acid as a dressing, but used iodoform in this case. The patient completely recovered. P. C. Smyly, of Dublin, operated successfully on the three cases next reported, and encountered difficulty during one operation from pus almost choking the patient. He, however, obviated this difficulty by turning the patient over on the affected side, the operator standing behind and operating from below. In six weeks the boy was well.

The same author, ¹⁶ in treating of the conditions under which empyema is developed, states that the results of the experience derived from the cases operated on in Dublin would tend to show that ultimately Estlander's operation will be deemed applicable to a much larger range of cases than at present. He considered it an important matter to determine the point where the opening into the cavity of the pleura should be. He thinks that situated over the ninth rib, recommended by Godlee, is perilously near the dia-

phragm. He approved of flushing the pleura both during and subsequent to the operation. In discussing the views of Stokes, it was stated by Heuston that Estlander's operation was required only in cases of very long standing, where there was a space which could not be occluded unless the chest-wall were allowed to adapt itself to the collapsed lung. He turned the flap of periosteum over the end of the rib, where it had been cut across, and this hindered the absorption of the discharge by the cancellated bony tissue, and thus avoided pyæmia.

Barlow¹⁰⁷⁷ ~~Dec. 21, 1888~~ reports an interesting case of empyema in his service in the children's ward of the University College Hospital. A boy, aged 11 months, had suffered with a bad throat, with swelling of the neck, discharge from the nose, and trouble of his ears. He was admitted into the hospital with a temperature of 104° F. (40° C.), uttering short cries, breathing quickly, and catching his breath,—indications of pneumonia. The upper two-thirds of the right lung were dull, with bronchial breathing and bronchophonic resonance, and the rest of the side gave defective resonance, with rather weak breath-sound. A large hypodermatic needle was inserted near the angle of the right scapula, and soon this fluid withdrawn. Under the microscope many pus-cells were seen, and afterward micrococci, diplococci, and a few small chains were found. Two days subsequently a free opening was made into the chest and a small piece of the ninth rib removed, when 7 ounces (217 grammes) of fluid escaped, and five days later shaggy lymph.

Rickman J. Godlee, of Brompton, Eng.,² ~~Oct. 15, 1888~~ states that no position is so good for incision in empyema as that above the ninth rib, just outside the angle of the scapula. If the chest be very full, a good plan is to place the patient well over on the diseased side,—semi-prone, in fact. It will then be found quite easy to reach the ninth rib outside the scapular line by standing behind. The time of removing the tube depends upon the amount and character of the discharge. If the tube should have slipped in through an anterior opening, the original opening should first be enlarged; and, if not found, it may be necessary to make a posterior incision for its removal. Double empyema is not so rare as might be supposed. The greater number of pulmonary abscesses encountered by him are bronchiectases, and the treatment has not been very successful.

Camille Moreau, of Charleroi,⁵² called the attention of the Belgian Academy of Medicine to his paper of 1891, in which he took the position that in cases of pyothorax of the gravest kind it is hardly necessary to resect, in much length, numerous ribs. He now re-affirms his position as to Estlander's operation, giving his own experience in a case of empyema in which he did not resect any but small fragments of the fifth, sixth, and seventh ribs, and in which the patient was entirely cured. He saw this patient in August, 1891, and in September, 1892, and found him perfectly restored. His weight had increased; the thorax, on the side operated, had increased by four centimetres in circumference, and the opposite side had also increased three centimetres. The pieces of ribs resected had been reproduced, the patient no longer coughed or expectorated, and his general health was satisfactory. He also mentions a new operation performed in 1891, after the patient had been treated unsuccessfully by the usual operation of incision, followed by numerous irrigations, with antiseptic solutions. A resection of four centimetres of the sixth rib and five centimetres of the seventh, followed by a large opening of the pleura and the introduction of a drainage-tube two centimetres in diameter, were sufficient to effect a cure. Deroubaix and Gallet, who were appointed a committee from the academy to report on this last paper of Moreau, state that Moreau's experience is not wide enough to enable him to deduce a fixed rule. The academy especially approved of a re-examination of patients from time to time after operation, and a report thereon such as Moreau made.

Three cases of empyema occurring on both sides within the same period of illness have been reported. Walter Carr presented to the Clinical Society of London² notes of a case treated by drainage. The boy, aged 8, had been sick eighteen days. The right side was aspirated first, and 8½ ounces (264 grammes) of pus were evacuated. Next morning the left side was operated upon by the resection of a portion of the eighth rib. Naish performed the partial excision under cocaine, and relieved the boy of 7 ounces (277 grammes) of pus, and left a large drainage-tube. Another operation was performed four days afterward, when the sixth rib on the right side was partially excised under cocaine and a drainage-tube left. Eventually both lungs expanded completely and the boy recovered perfectly. L. A. Dunn mentioned a case on

which he had operated two years ago. He first drained the left, and seven days afterward the right side. The patient had done as well as if he had had only one empyema. Cassel ⁶⁹ _{Aug. 10, 1902}, ² reports a case in a child of only 4 months. On the left side there was well-marked bronchial breathing of the angle of the scapula behind, and from this point downward on both sides the percussion-note was impaired and the breath-sounds ill-defined. At first drainage of each side by thoracentesis and subsequently resection were resorted to, but the child died and a post-mortem was held. Pleuritic adhesions were found everywhere except at the sites of the empyemata. A vomica was found in the left lung communicating with the pleural cavity. Many tuberculous foci were found scattered through the lungs. "Double-sided pleurisy is not so very rare," comments a writer. ² "The only treatment that could be practiced here was opening the chest. Tuberculosis of the lungs may, however, be a contra-indication. At this age the recognition of a tuberculous lesion in the lungs would necessarily be very difficult."

D. B. Lees ¹⁰⁷⁷ _{July, 1911} shows the points of differential diagnosis between collapse of the lung in children and pleuritic effusion to be: (1) the absence of displacement of the heart in collapse, its presence in pleuritic effusion; (2) the temperature. Between pneumonia and pleuritic effusion he points out: (a) The site of the dullness. In pneumonia the dullness is more toward the back of the lung at the posterior base; in pleuritic effusions and empyemas the dullness is more marked in the axillary region. (b) The character of the dulness. There is more elasticity and less flatness in pneumonia. (c) The breath-sounds. He cautions against too much reliance upon these, as errors occur. (d) Displacement of the heart. (e) The temperature. As a rule, pneumonia has a higher temperature. He advises the use of the exploring-needle if any or all of these diagnostic points exist. A single aspiration should precede resection in order that the parts may have time for re-adjustments.

ABSCESS.

Vanlair ⁵² _{Feb. 25} reviews the subject of subdiaphragmatic abscess, and shows that pneumothorax and hypophrenic collections are very important from a clinical stand-point. A child, aged 6, was suddenly seized with a chill, without any apparent cause. A violent

diarrhoea set in, and griping occurred, with tenderness in the right hypochondriac region below. No coughing. A collection of water, or most probably pus and air, in the right pleura, hypophrenic gases, and left pneumonia. Incision into the subphrenic abscess and triple drainage by large tubes and iodoform gauze, after common sea-water irrigation. Final cure in seven weeks after the beginning of the sickness, three after operation.

Quite an interesting account of a lumbar abscess, resulting from purulent pleurisy, is given by Manillier, of Crémieu.²¹¹ This occurred as far back as 1857, was on the right side, and the age of the patient was 36. The opposites of these accompaniments have existed in four cases reported from literature by Dubreuilh. Twenty-five days of violent, incessant coughing existed before pus showed itself in the matter expectorated. An abscess, having the general appearance of a fluctuating tumor, appeared at the width of two or three fingers from the last false rib, and was evacuated by a deep incision of a bistoury. Complete recovery occurred in thirty days afterward.

A similar case is reported by Meltzer,¹ in a child of 26 months. There was sudden onset, with high fever. On the twenty-seventh day there was a new and sudden onset of high fever, dullness on the right side, and pain in the right hypochondrium. To evacuate this subphrenic abscess, Meltzer widened a small orifice in the diaphragm and inserted a rubber tube, although the incision had been made into the thoracic cavity. It was necessary to use quinine before the fever was controlled, but an uninterrupted recovery resulted. Meltzer attributes the abscess to migratory pneumonia. Vanlair calls such cases hypophrenic empyema, with a mortality of 50 per cent., and mentions fourteen recoveries in the literature of the subject. In summing up the cases of Vanlair, Manillier, and Meltzer, it is proper to say that each has a different explanation of the case, and especially of the transmission of germs from one cavity to another. Vanlair traces the origin of the subphrenic abscess to enterocolitis, which set up a circumscribed peritonitis from which again the neighboring viscera were infected; first the phrenic fold of peritoneum, then the diaphragmatic pleura, then the costal pleura. The pleurisy thus developed becoming purulent, there occurred pleuro-pulmonary perforation and rupture of the diaphragm. The case of Manillier

may not be properly called a subphrenic abscess, as it occurred in the right lumbar region, but its etiology is none the less closely connected with a previous purulent pleurisy; and its occurrence and cure before the invention or, at least, the author's knowledge of the aspirator and perfected apparatus for operations in empyema, as well as before the use of antiseptics, makes it especially worthy of study. The case of Meltzer speaks for itself.

Another case of subphrenic abscess is reported by Bruce and Morgan.⁶ A woman aged 25 had suffered from symptoms of gastric ulcer, at intervals, since 1885. On February 19, 1891, she was suddenly seized with a violent pain in the epigastrium. Her condition finally required a resection of portions of several (fifth, sixth, and eighth) ribs and the evacuation of pus which had burrowed through the diaphragm and caused empyema. She died June 12th, eighty days after the first operation. The post-mortem showed, among other things, abscess of substance of the left lung.

S. Trivuss⁵³⁰,²¹ makes the following points of differential diagnosis between right subphrenic abscesses and pleural effusion: There is usually a displacement of the heart to the left in cases of pleural effusion on the right side, the liver being displaced downward. There is a distinct zone of resonance between the dullness over the heart and the corresponding part of the right side, as well as a zone which gives a clear sound on percussion over the dorsal vertebræ. His diagnosis of subphrenic abscess of the right side thus arrived at was corroborated in the operation.

The subject of subphrenic abscesses caused by perforation of the vermiform appendix and complicated in a great many ways with diseases of the abdominal cavity has been ably treated by Osler⁵⁰ and Mason,⁹⁹ with discussions by Welch, Fitz, and others.²⁰⁸³,⁹⁹ May 20, Aug. 24

Pulmonary abscess communicating with the posterior mediastinum was the subject of a paper read by Morison before the Clinical Society of London.² A lady, aged 32 years, with a slight cough, at first began to expectorate an offensive and purulent substance that seemed to escape without effort into her mouth. Three months after the birth of her second child, she underwent an incision in the right interscapular region. Evacuation of pus and drainage were done antiseptically. She died three weeks after the operation.

Pneumotomy.—J. J. Matigon, of Bordeaux, ¹⁸⁸_{Feb. 19}, describes the condition of a young man who kept on wet clothes after falling into the water while perspiring, in July, 1889. The patient felt a distinct chill while in the water, and a week after this exposure he was attacked with a stitch in his right side and had fever. Frequent relapses occurred from imprudence on his part. Aspiration of the chest was resorted to, with injection of eucalyptus-oil. On January 27, 1891, Baudrimont performed pneumotomy for abscess of the lung. The cavity was washed out with a solution of boric acid, and powdered iodoform was dusted into it. The wound was dressed with gauze and a bandage. Six months later the patient was examined and declared to be well.

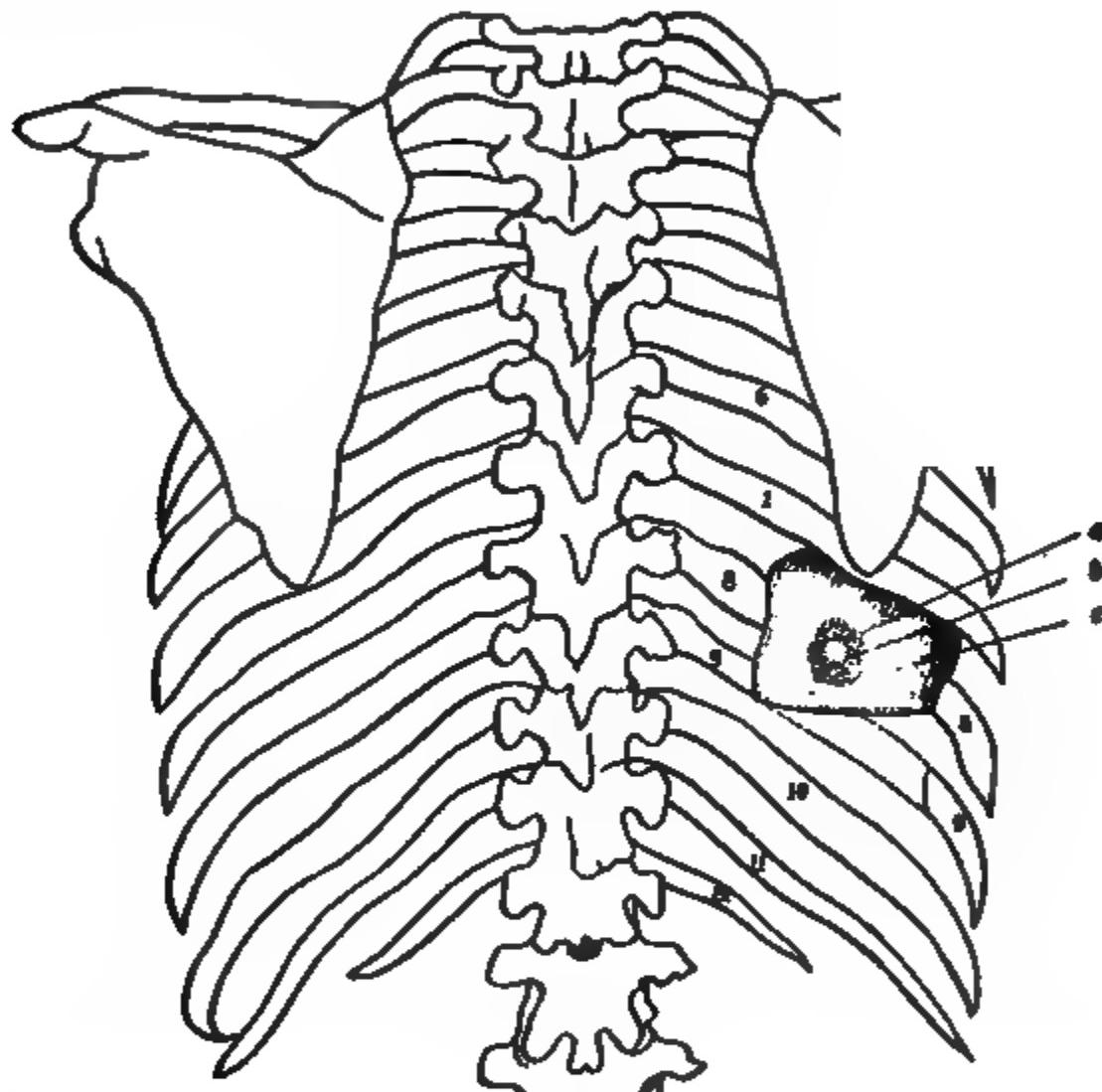
J. Blake White, of New York City, ²⁰⁰⁸_{Nov. 26, 1891}, reports two operations by pneumotomy for the relief of tubercular abscess and gangrene of the lung in the same patient. He says that although an ordinary abscess of the lung might terminate in recovery, no case of gangrene of the lung had been known to do so without surgical interference. A girl, aged 13 years, was suffering with a gangrenous area of the right lung, and there was an abscess of the same communicating with a bronchus. On verifying this condition, an incision was made in the sixth intercostal space, about an inch anterior to the axillary line, and, the finger detecting fluctuation, an opening gave exit to 2 ounces (62 grammes) of fetid pus. Under irrigation with drainage she improved; but, three months afterward, another incision, an inch posterior to the axillary line, removed fetid pus and portions of gangrenous lung. Drainage was continued for eight months, with a complete cure.

Dubreuilh, of Montpellier Hospital, ⁵⁵_{Dec. 10, 1891}, reports a case of purulent pleurisy opening in the lumbar region. A young man presented an empyema, which migrated to the ileo-costal space on the left side, and the lumbar abscess was opened by an incision $1\frac{1}{2}$ centimetres ($\frac{5}{8}$ inch) in length, discharging a litre (quart) of sero-sanguinolent fluid. It was washed out with boric-acid solution and packed with gauze.

Mediastinal Abscess.—A case of abscess is reported by Geo. H. Weaver, of Chicago, ¹⁰⁸⁰_{Jan.}, showing the difficulty of diagnosis based upon physical signs in certain parts of the thoracic cavity. It was only after a post-mortem examination that the case was found to be more than pulmonary abscess, which was the diagnosis

made by Weaver and Ingals, and which was later concurred in by Christian Fenger. It proved to be a mediastinal abscess of the middle and posterior spaces communicating with the right bronchus above and the general pleural cavity of the right side below, the lung itself being collapsed and adherent to the spine for five inches.

Messner, of Munich, Germany,³⁴ reports a case of (cold)



OPENING OF LUNG-ABSCESS THROUGH THE WALL OF THE THORAX. (MESSNER.)

a. fistula, which led into the abscess of the lung. b. firm adhesion between the costal pleura and pulmonary pleura of the size of a small coin (Südfleck); c. wound pleura, by means of which could be seen the right lung moving backward and forward on expiration and inspiration after the removal of fungous granulations from the peripleuritic abscess without the opening into the pleural cavity being enlarged.

Münchener med. Wochenschrift.

tubercular abscess of the lung rupturing outward through the wall of the thorax, and explains it by the accompanying figure.

It will be seen from the figure that the abscess involved a considerably larger area around this, that it was situated immediately below the angle of the scapula on the right side, and that the eighth and ninth ribs were partly in the way of the drainage of the cavity in which the abscess was contained.

The patient, aged 42, female, had suffered from a swelling

having the appearance of a tumor. The differential diagnosis was between empyema and abscess. In the operation which was performed for evacuating the abscess the eighth and ninth ribs were found to be carious, and were consequently resected, the pus evacuated, and the cavity packed with gauze, after removing the fungous granulations with sharp spoons and scoops. A drainage-tube eleven centimetres long was left in the wound. For fourteen days after the operation daily dressings were required on account of the great amount of fetid pus. Four weeks after the operation the drainage-tube had been entirely removed by cutting it off piece-meal. For ten days a communication with the bronchus could be seen. Five weeks after the operation all fistulæ were healed, and the patient was dismissed well.

Messner reports another case of a tuberculous abscess healing spontaneously. The patient was a boy, aged 16, who had suffered with spondylitis of the fifth and sixth dorsal vertebræ with a gibbous formation, which had been treated by him for a long time with suspension apparatus. During this treatment there appeared on the right side, under the gibbous formation, in the interspace of the sixth dorsal vertebra, an abscess which lay very deep, indeed, but which he succeeded in defining very well both by subjective and objective symptoms. Upon using a trocar, however, no pus came out of the cannula; and even an aspirator failed to bring any fluid. On the night following this exploration the patient coughed violently and expelled half a gobletful of mucus with caseous masses mixed with pus. Upon examination on the following morning, the circumscribed dullness on the right side behind and beneath the gibbous formation, ascertained to be present the day before, had disappeared. The patient coughed for about six weeks, and expectorated a great deal of pus-mixture. He had never coughed, up to this time; and no disease of the lungs had ever been discovered by repeated examinations. After the abscess had discharged spontaneously through the lungs, he recovered so quickly, and, indeed, so completely, that he again undertook his occupation of a shoemaker. The lungs and vertebræ were restored.

Hofmann, of Hipolstein, Germany,³⁴ reports two cases similar to those of Messner. One patient, a male aged 35, had been under treatment for chronic laryngeal and pulmonary tuberculosis.

He had a fluctuating, dull place in the space between the fifth dorsal vertebra and the scapula, about the size of an apple, causing the patient to complain of pain, especially when pressed on the fifth or sixth spinous process. Puncture with a probe revealed thin pus. On the following night he coughed up a quantity of pus-mixture, nearly choking him. This mixture increased in quantity, and seemed to spring from carious vertebræ, causing an abscess which doubtless broke into the bronchus and emptied itself. The other case was unusually interesting. The patient complained of a sharp pain in moving and referred it to the left side. He heard a noise inside his windpipe, and immediately a quantity of pus filled his mouth. An examination showed thickening of the cervical vertebræ, considerable pain upon pressure within or without the throat. A fluctuating tumor the size of a fist was found on the upper border of the twelfth dorsal vertebra, with dullness in its neighborhood; the lungs showed vesicular resonance at all points except one upon auscultation, and percussion was clear and distinct. Four years before abscesses had been opened, and these were re-opened and discharged now. The man was not seen for six months, and then was drilling in a military parade. His lungs were examined, and it was found that they were sound and were carrying on respiration regularly. A fistula was found communicating with the throat and vertebra, where the fluctuating tumor had existed. This fistula was injected with iodoform and ether, and the breath and taste of the patient were found to be impregnated with both,—caused by the abscess burrowing from its origin in the caries of the cervical vertebræ through a large bronchus, down into the pleura and tissues of the back. By means of the injections the discharge of pus was diminished two-thirds. His final cure, if obtained, was not ascertained.

PNEUMOTOMY.

Manclaire¹⁶⁴ sums up the indications for pneumotomy as follows: (1) in acute pulmonary affections which rapidly attack the pleura, such as gangrene, haemorrhagic infarctus or suppurating embolisms, spontaneous or traumatic abscess, and hydatid cysts; (2) in chronic excavations, especially bronchial; (3) in circumscribed tubercular cavities without peripheral tubercular infiltrations; (4) in certain excavations of doubtful nature formed at the expense of both the pleura and lung, and communicating with the bronchi.

Pneumotomy for putrid bronchitis and cavity of the upper lobe of the left lung was performed by I. Hofmokl, of Vienna. ^{Aug. 19; July 29} 96 A man, aged 25, had suffered from bronchitis for four years, accompanied by fetid breath and expectoration. Two operations were performed for his relief. The first consisted in passing a Paquelin thermo-cautery into the site of what was diagnosed, by dullness, diminished breathing, and subcrepitant râles, to be the cavity. An incision ten centimetres in length was first made and a sound passed before the cautery, but no cavity was reached. The second operation consisted in resecting the left third rib, thus enabling the thermo-cautery to reach the cavity. The patient recovered in ten days.

Hofmokl ^{Aug. 19; July 29} 96 also performed pneumotomy for bronchiectasis of the apex of the right lung in a patient aged 43 years. An opening in the second intercostal space was first made into the pleura with the knife, and the Paquelin cautery used as in the previous case. Evacuation of fetid pus was thus obtained. A drainage-tube was introduced and iodoform-gauze packing used to stimulate granulation. The recovery of the patient was complete in fifteen days. A slight dullness, upon physical examination, remained.

Trzebicki, of Hofmokl's clinic, ^{Nov. 18, 19, 20; July 1} 96 presents the following statistics :—

	Total Cases.	Cures.	With Fistula	Unimproved	Dead.	Result Unknown.
Abscess of the lung	42	14	3	..	24	1
Pulmonary gangrene	24	7	1	1	18	2
Tuberculous cavities	24	5	..	5	9	5
Bronchiectatic cavities	12	..	..	1	8	3
Echinococcus of the lung	45	37	1	..	6	1
Pneumectomy (resections)	5	1	..	..	..	4

Among the cases of tuberculous pulmonary cavities one died after three years, of tuberculosis. To these cases are to be added two more from Hofmokl's clinic: a pulmonary abscess following an acute right-sided pleuro-pneumonia and a case of putrid bronchitis, both with recovery. Hofmokl advises preliminary resection of a rib in order to have space to operate. The focus should be opened with the thermo-cautery, with which the hæmorrhage is slighter.

Tuffier, ^{Dec. 28; July 1} 96, as reported in ANNUAL of last year, performed

a successful resection of the apex of the right lung for tuberculous deposit, with no return in two years.

PNEUMONECTOMY.

D. Lawson, of Hull, Eng.,², reports a successful case of pneumonectomy on the human subject, after trial on a rabbit and also on a dog. He mentions his knowledge of only two pneumonectomies on the human subject before his, those being by Tilmanns, of Munich, Germany, and Tuffier. There have been five operations of this kind, according to the table of Trzebicki. An incision was made from midsternum along the course of the second rib, through the pectoral muscle, nearly to the edge of the anterior axillary fold. From the inner end of this he also cut for a couple of inches downward, along the middle of the sternum. The skin and muscle were then reflected from the surface of the second and third ribs, and a number of vessels spouted and were secured,—mainly branches of the acromio-thoracic and intercostals. The external intercostal muscles were then separated above and below, from the two ribs, and, with a periosteal elevator, the pleura was detached and stripped off from the inner side. With a fine saw the ribs were divided, through the cartilage internally and through the bone externally, near the outer angle of the incision. After pinching up the pleura he pushed a trocar into it, and connected the cannula by tubing with a Junker bottle and bellows, by which air mixed with carbolic acid was pumped slowly into the pleural cavity. The lung could be partially seen sinking slowly from the chest-wall, but no dyspnœa or cyanosis followed. He therefore laid open the external layer of the pleura the length of the external incision, and found the lung completely collapsed and moving up and down rhythmically with the diaphragm. He then detached the apex of the lung from extensive adhesions, and, transfixing its substance with a strong needle armed with large twisted-silk thread, tied it in two places below the diseased portion, which was cut off. The portion removed was the size of half a fist and contained a dense, tuberculous mass. The patient, female, aged 34 years, first consulted Lawson in August, 1892. She had been married thirteen years, but had no children. The operation was performed on February 14, 1893, and chloroform was used with no untoward results. She had a temperature

of 99.2° F. (37.3° C.), pulse 88, and respiration 32, on the morning after the operation. On the fourth day there was a sudden development of a limited patch of dry pleurisy on the left side (opposite), which gave her much pain and greatly crippled the respiration, but this gradually disappeared. The first marked rise of temperature was at the end of the second week, 101.6° F. (38.7° C.), but this also gave no serious trouble, and had been reduced at the end of a month after the operation. As this rise of temperature seemed to be due to a quantity of extravasated blood, he passed in an India-rubber tube and sucked out with a syringe the fluid that did not discharge itself by overflowing, and dressed antiseptically. The temperature now dropped to normal and respirations to 24. The empyema that resulted from this hæmatothorax was the next complication. On May 2d the patient had improved rapidly, both in appetite and flesh, and was walking about the room making preparations to go home. Lowson advises a drainage-tube in view of the complications he encountered.

Charles E. Jennings, of London, ², describes his method of pneumonectomy, which he considers better than that of Lowson. ². As performed on the dead body, Jennings makes an incision four inches in length, parallel to the lower border of the first rib, and carried outward toward the coracoid process. The skin, fascia, and pectoralis major are divided. A vertical incision must be made from the third costo-chondral junction below, to the inner extremity of the horizontal incision above. The upper border of the pectoralis minor having been depressed, the second rib must be divided, first close to the outer extremity of the horizontal incision, and then through its chondral attachment. The intercostal muscles must be divided in the lines of the cutaneous incisions; a flap consisting of skin, fascia, pectoralis major, and part of the second rib and intercostal muscles can then be thrown down and the parietal layer of the pleura can be divided. Sufficient space for insertion of the operator's hand within the thorax has been gained.

As thus described in his own words, the operation resembles somewhat Delorme's idea of a trap-door to reach the contents of the chest. There is evidently an advantage in closing up again the opening after the removal of the lung or portion thereof. Only one rib is really partially removed, and that is replaced. The internal mammary artery is avoided.

George Foy, of Dublin, ²²_{July 11}, brings to light a case of pneumonectomy that may have been the first ever performed. It dates back to March, 1821, and the patient lived to July, 1822, when an attack of measles carried him off. The operation was performed by Milton Anthony, of Augusta, Ga. ²⁰⁸⁴_{v.6,p.108,22} A fall from a horse had fractured a rib, empyema had set in, and four years afterward, when Anthony operated, he found the lung-tissue disorganized, and determined to remove with his fingers all diseased parts of it, as well as excise portions of the fifth and sixth ribs.

NEW INSTRUMENTS.

Alfred Shewen ²⁸⁷_{Aug. 15} has devised an ingenious method of securing a partial vacuum in the thoracic cavity by means of suction, which he applied with success to expand the lung in the case of empyema he describes. The difficulties which are overcome by suction are thus classified ; (a) to keep the pleural cavity air-tight ; (b) to provide for the constant discharge of pus ; (c) to cause little or no inconvenience to his patient. A small brass cock, about the size of one of the cocks on an aspirator, was fixed air-tight by means of a flange and screw through the centre of a piece of rubber about six inches in diameter and one-eighth of an inch thick, and the under surface of the rubber was thickly coated with a semi-solid adhesive substance which would hang on to the skin, but not actually stick to it. A piece of rubber tubing about six inches long was attached to the mouth of the cock, which protruded on the inner surface of the rubber. When this sheet of rubber was laid over the wound, with the piece of rubber tubing reaching into the pleural cavity, he possessed a means of lowering the atmospheric pressure within the pleural cavity at will. The syringe which he used for exhaustion was an ordinary brass one about the size of an ear-syringe.

The improvement on Potain's aspirator, as devised by Pizzocaro Pietro, of Italy, ⁵⁸⁹_{July 10} is thus described : (a) A sliding sheet, *R*, upon a cannula can be fixed at any point, governing, in this way, the quantity of the trocar that penetrates the thoracic cavity, so as to render any movement impossible. There is a spiral spring which surrounds and clamps the cannula, but which does not prevent its sliding. (b) A steel cylinder, *G*, surrounds entirely the trocar and, being closely adherent to it, presses forward the cannula.

(c) The syringe of the exploring aspirator is a combination of that of Pravaz and that of Potain. It consists, as that of Pravaz, of a glass cylinder, *V*, of a little larger capacity, having two solid metallic pieces at each extremity, *A*, *B*. In this barrel there is a



FIG. 1.

IMPROVED ASPIRATOR. (PIETRO.)
Riforma Medica.

FIG. 2.

piston, *E*, suspended from the steel rod *C*, which is sufficiently large to include the stylet *D*, ending in *F*. The weight, *D*, cannot leave the steel cylinder entirely, but becomes fixed when drawn to *C*. The trocar, *G*, is attached to the aspirating apparatus, and is

adherent to *H*. The cylinder has an opening at *R*, which can prevent the entrance of air, and, in cases where the exploration for effusion or pus proves negative, serves a good purpose. Pietro has used this in an interesting case of empyema. Fig. 1 shows only the trocar and cannula. Fig. 2 shows the whole instrument with attachment to trocar and cannula.

SURGERY OF THE ABDOMEN.

BY JOHN H. PACKARD, A.M., M.D.,

ASSISTED BY

ROBERT G. LE CONTE, M.D.,

PHILADELPHIA.

R. P. Harris, of Philadelphia, ⁴⁸ objects to the term "laparotomy" as incorrect, and proposes to substitute for it "cœliotomy" (c soft). The former would seem properly to apply to a section made between the short ribs and the iliac bone, or in the flank, the Greek word *lapara* signifying that region; while the other word, from *koilia*, the abdomen, clearly means any such operation through any part of the belly-wall. Although adopted by a number of prominent writers, the suggestion has not yet prevailed with the profession at large. Harris's view is defended by Staples, of Minneapolis, ¹⁰⁵ but Buchanan, also of Minnesota, ¹⁰⁵ while admitting that "laparotomy" is clearly wrong, objects that Greek medical authors do not use *koilia*, but *gaster*, to denote the abdomen, and thinks "gasterotomy" is the proper term to employ.

Henry Morris ¹⁰⁷⁷ gives a clinical lecture on the surgical diseases of the umbilicus; discussing epithelial cancer, sarcoma and fibroma, papilloma, urachal cysts, abscesses and fistulæ,—fæcal fistula, biliary fistula, hæmorrhagic fistula,—and, finally, erysipelas, phlebitis, and septicæmia.

LIVER.

Abscess.—Fontan, of Toulon, ¹⁴, presents an interesting case of hepatic abscess in an army officer lately returned from Tonkin. He had had intermittent fever and diarrhœa, followed by dyspepsia, constipation, and frequent abdominal pain. The liver-dullness extended six inches downward from the fourth rib, and the intercostal spaces over it were enlarged; a floating kidney on the right side was also made out. After repeatedly puncturing the liver anteriorly without finding any pus, it occurred to Fontan that the

abscess was in the posterior portion of the right lobe, and by its size had pushed the kidney out of place. A puncture proved the diagnosis correct. A portion of the ninth rib was resected, the pleural cavity opened, and the costal pleura stitched to the diaphragmatic pleura in such a manner as to wall off the rest of the cavity. The diaphragm was then incised and the abscess opened. About a quart (litre) of pus escaped. The cavity was well curetted and washed out, two drainage-tubes being left in. The patient made a good recovery.

Weiss, of Nancy,¹⁸⁴ gives a case of cirrhosis of the liver in a woman aged 30 years. The abdomen was opened under the impression that the trouble was due to gall-stones. The gall-bladder was found in a healthy condition, but on the posterior border of the liver a tumor was felt, as large as a fist, which, when opened, discharged nearly a pint ($\frac{1}{2}$ litre) of ascitic fluid stained with bile. This cavity was drained, and discharged freely every day a quantity of ascitic fluid. The patient improved, and at the end of a month was up and about the ward. The fistula continued to discharge this liquid for over two months, when it suddenly closed, and immediately the symptoms of cirrhosis re-appeared. The patient died in coma eight days later, after frequent vomiting of blood.

H. E. Collin, of Lille,¹⁰⁰ reports a case of abscess of the liver in a soldier aged 24 years. During the previous sixteen months he had been ill with typhoid fever, dysentery, and intermittent fever in the order named. The abscess was opened in the eighth intercostal space just within the axillary line. Nearly a quart (litre) of thick, non-odorous pus was evacuated, and the patient made a good recovery.

Delbet,⁵ has reported the case of a boy, 2 years and 4 months old, with inherited syphilis, which had not been recognized; on account of a growth supposed to be connected with the liver, an exploratory cœliotomy was performed, and the right lobe found enlarged, pale, and mottled, while indurated glands existed in the gastro-hepatic omentum and along the edge of the rectus abdominis muscle. An improvement in the child's condition immediately began, and all the symptoms subsided, but about three months later the appearance of gummatæ confirmed the diagnosis of syphilis.

An interesting case is related by Richelot,¹⁷ in which a woman, 28 years old, was disabled by a painful movable tumor in

the right iliac fossa. With the idea that it might be a tuberculous typhlitis, it was cut down upon, and proved to be the displaced liver, adherent to the abdominal wall by a thickened portion of its capsule. The organ was pushed up as nearly as possible into its normal site, and fastened there by means of three catgut sutures passed through the thickened capsule and the deeper layers of the abdominal wall. Nearly three months afterward the relief given was still complete; and Richelot claims that this is the first instance of lasting success. In two cases reported by Billroth and Tscherning, it was not the whole liver, but only a lobule, that was mobile; in one by Gérard-Marchant relief was not obtained until the kidney, also movable, was fixed, and the liver subsequently re-descended.

Ferron, of Bordeaux,¹⁸⁸ _{Aug. 22} reports two interesting cases of abscess of the liver in army officers aged 28 and 27 years. In each case dysentery had preceded the hepatic abscess, and the pus had made its exit through the bronchial tubes. The symptoms were extreme emaciation and anaemia, a constant cough with very free expectoration of pus, fever varying from 102° to 103.5° F. (38.9° to 39.8° C.), a good appetite, and no diarrhoea. The pleural cavity was freely opened in each case, the abscess flushed out, two large drainage-tubes inserted, and the whole covered with large antiseptic dressings. Convalescence was very tedious, but both cases made good recoveries. Ferron concludes that every case of hepatic abscess should be freely opened and drained, no matter what outlet the pus has made for itself.

J. Cleasby Taylor, of Edinburgh,⁶ _{Aug. 19} reports the case of a man afflicted with abscess of the liver, in whom there was not only an abdominal tumor, but apparently an empyema of the right pleura, with progressive anaemia and emaciation, dyspnoea, and purulent expectoration. Aspiration of the pleura was performed, and 35 ounces (1090 grammes) of brick-colored pus drawn off. Part of a rib was then excised, giving exit to 20 ounces (630 grammes) of clear brown serum. The knife coming in contact with a white, shining, tendinous-looking membrane, this was divided, and a large quantity of reddish pus escaped, with diminution of the abdominal swelling. Free drainage was kept up, and the patient did well, gaining flesh and strength. When he was last seen, there was a small sinus through which a few drops of biliary fluid escaped daily.

C. J. Bloch, of New Orleans,²⁰⁷ reports a case of hepatic abscess with fatal result. The abscess was a large one in the right lobe of the liver, and was evacuated by free incision, a portion of a rib being excised. The cavity was at first packed, and later irrigated with carbolic solution and peroxide of hydrogen. At the end of the second week, during the irrigation, the patient was seized with a violent attack of coughing, became cyanotic, and died. Bloch accounts for his death by shock, produced by rupture of liver attachments, with a flow of pus and water into the abdominal cavity, superinduced by cough. In the discussion which followed this report, Chassaignac did not agree that the fatal termination could have been due to this cause. Sexton suggested that there might have been an opening into the pericardium, since the heart stopped before the respiration. He condemns resection of the ribs as a routine practice on account of traumatism, absorption of pus through the cancellous tissue, and subsequent necrosis. Early operation in all cases of abscess of the liver is imperatively demanded. Burns said that it was a fallacy to imagine that examination of pus from an hepatic abscess can reveal its source. Pus from the liver is just the same as any other pus.

J. W. Hulke² has narrated a case in which a hepatic abscess ruptured into the peritoneal cavity. By incision and flushing the man recovered so as some months afterward to resume his occupation. Another abscess (?) had several months previously emptied itself through the lung.

Three successful operations for abscess in the liver are reported from the Royal Victoria Hospital, at Netley.⁶ The duration of the symptoms varied from two to three months, and in each case the collection of pus was reached by incision through an intercostal space, although the distance from the surface varied considerably. Charu Chander Banerjee²⁸⁹, reports a case of liver-abscess the size of a cricket-ball, with recovery in five days after operation by free incision and drainage. A similar case is related by W. W. Golden, of Elkins, Va.⁵⁹

William Huntly²³⁹ reports a case of multiple abscess of the liver, with death on the fourth day after operation, recorded as confirming the hopelessness of those cases in which we have to deal with multiple abscesses resulting from or following dysentery and accompanied with diarrhoea.

From experiments on cats, Zancarol⁹¹ concludes (1) that abscess of the liver is of microbic origin; (2) that the chief factor in its production is the streptococcus; (3) that dysentery is of the same nature as hepatic abscess, and that the amoebæ found in the faecal discharges of persons otherwise well have nothing to do with its pathogeny; (4) that the entrance of the microbe is generally through the intestinal canal, and that it gets to the liver either through the portal vein or through the general circulation.

Cysts.—Boyer reports⁵ a rare case of cyst in the liver containing 10 quarts (litres) of liquid. The microscope showed no traces of echinococcus, and no bile-salts or pigment. There was no epithelial lining of the cyst. The time of development was four months. The author thinks there was an inflammatory condition, with occlusion of one of the biliary ducts.

Debove and Soupault¹⁵¹ report a case in which an hydatid cyst of the liver was ruptured by a fall; the cyst probably was in communication with the biliary passages, and the accumulation of fluid after successive punctures evidenced a biliary fistula into the peritoneum. Hydatids were found in the fluid.

Alexander Hugh Ferguson reports 27 cases of hydatids of the liver. He quotes Osler's²¹³⁵ statement: "Up to July, 1891, I have been able to find in the literature (and in the museums) only 85 cases in the United States and Canada." He says the disease was brought to Manitoba by Icelandic immigrants, and that among the 3000 Icelanders in Winnipeg considerable clinical material is afforded. Ferguson aspirates only in cases of simple cysts of the liver without daughter-progeny, and in those that have not supplicated. He refers to Davies Thomas's statistics,—411 tapping-operations on liver-cysts: 73 died, 5 not relieved, 92 failed to cure, 68 relieved, 163 reputed cured, and 10 cases result unknown. Treatment by direct incision and drainage is the most radical surgical procedure at our command. Where adhesions have not formed he anchors the cyst to the abdominal wall before opening. He reports three cases.

In one a number of cysts were removed and a partial hepatoectomy was performed, the patient recovering. In a second, three large cysts were broken down with the hand and emptied; on the eleventh day the patient contracted pneumonia, and died on the fourteenth, when an autopsy showed a calcified ectocyst in the

hypertrophied left lobe. The third case was one of suppurating hydatid cyst; hepatotomy was performed, but the man died on the twenty-fourth day, and it was found that only 8 ounces (248 grammes) of liver-tissue remained.

Bilhaut ³²¹_{v.4, No. 4, June 16} ⁸⁰ reports a successful operation for hydatid cyst of the liver, in a child $6\frac{1}{2}$ years old. He says that antero-inferior cysts develop in the direction of the abdominal cavity. Here laparotomy and excision are indicated. Postero-inferior cysts should be treated by puncture, but in case of recurrence should be incised. The seat of operation should be in the lumbar region. The antero-superior cysts are those which puncture can cure, except in cases where there are many daughter-cysts. In the postero-superior cysts puncture should first be tried. Whenever the puncture shows the presence of pus the cavity should be treated as a simple abscess. Care should be observed as to the strength of any injection used. C. J. Bond ²_{Dec. 17, '99} advises the complete evacuation of the cyst contents, and, in certain cases, the return of the ectocyst so treated into the peritoneal cavity without drainage.

James Watson ⁶_{Dec. 8, '99} reports a case of hydatids of the liver in a girl, aged 12 years, who recovered after repeated paracentesis. Several cysts were emptied. No hooklets were at any time detected, but the fluid was non-albuminous and rich in chloride of sodium. Watson says that hooklets are frequently absent from hydatid tumors. Flagge has pointed out that a tumor which is "cystic and imbedded in the substance of the liver can be nothing but an hydatid."

A case in which hydatids of the liver were discharged through the pleura, being coughed up, has been recorded by Courtin. ¹⁸⁸_{June 18} The patient, a woman aged 22 years, had severe pains beneath the false ribs on the right side, and the liver was enlarged; as there were signs of effusion of liquid into the pleura, thoracocentesis was four times performed at intervals of a few days. After the third operation the patient had a violent access of coughing, and brought up a thick, glutinous liquid, containing shreds of daughter-cells; at the fourth, 50 grammes ($1\frac{1}{2}$ ounces) of pus, with *débris* of vesicles, were removed, and the cavity washed out with alcoholized water. From this time on recovery was rapid.

A case is reported by Villar, of Bordeaux, ⁹¹_{May 10} in which a man, 35 years old, had multiple hydatid cysts of the abdomen, one of

them being situated in the retro-vesical space; the disease had begun with a swelling in the iliac fossa eight years before. Upon opening the abdomen, a cyst of the liver was found, incised, and the sac "marsupialized"; several cysts of the mesentery were excised; the retro-vesical cyst could not be completely detached, and was fixed to the abdominal wall, its drainage being provided for. The man was discharged cured, but with a small fistula still open in the hypogastrium.

Cases of *echinococcus* cyst of the liver, successfully treated, have been reported by many writers: in women, by Allingham,²² Bayer, ⁸⁸ Stirling, ²⁸⁵ Hunter, ¹⁰⁵ S. Smith, ²⁸⁵ Sutton, ²² Oliver, ² and Malagola ⁵⁸⁹ (by puncture alone); in a man, by Reynier ¹⁴; in a youth of 17, by Doerfler ³⁴; in children, by Vallas ²¹¹, and Piéchaud. ¹⁸⁸ In one instance, recorded by Tillaux, ¹⁶⁴ in a woman, the cyst had supplicated. Postempski ³³⁶ met with a case in which the cysts were connected with the ovaries; it also resulted favorably.

Bruce Clarke ² calls attention to the uncertainty and actual risk of the treatment of hydatid cysts of the liver by tapping, and advocates their complete removal by means of abdominal section. In support of this view he adduces three cases in which this method was employed with success, as well as one of hydatid of the kidney, excised with favorable result, notwithstanding the fact that the adhesions were so numerous and firm as to forbid the removal of some portions of the cyst-wall.

Tumors.—Von Bergmann ² has reported a case of successful removal of an adenoma connected by a thick pedicle with the lower surface of the liver, in a man 45 years of age. The abdomen was opened in the median line. An attempt was made to sever the pedicle with the thermo-cautery; but the bleeding was so free that the knife was used and the vessels tied, iodoform gauze being placed on the stump, which was dropped back, and the wound partly closed by suture. Bardeleben said that he had removed a sarcoma of the liver two years previously, and no recurrence had yet taken place. Koenig had found advantage in excising a tumor of the liver by a circular incision, then detaching the surrounding peritoneum, and bringing it together by means of sutures; he thought this method gave greater security from haemorrhage than the use of the iodoform gauze. A case is reported

by Schmidt, ²_{Mar. 11}, in which a pedunculated gumma of the left lobe of the liver was successfully removed by cœliotomy. The pedicle was fastened in the abdominal wound and treated extra-peritoneally; four arteries and six veins were tied, and oozing arrested by galvano-cautery; the raw surface was closed by a skin-graft.

Roberts, of Philadelphia, ²⁰²_{Dec. 10, '78}, reports a case in which an operation for the removal of a tumor from the under surface of the liver, just above the gall-bladder, was abandoned on account of free hæmorrhage from a wounded vein. The bleeding was stopped by stitching the gall-bladder back into its usual position.

A case of congenital hernia of the liver is reported, ⁹⁹_{Aug. 2}, in which the operation was performed twenty-four hours after birth. The hernia was into the covering of the cord, and consisted of the liver about the size of a mandarin. There had been no return of the hernia five months after the operation.

Harley, of London, ¹⁰⁷⁷_{Aug. 2}, again advocates hepatic phlebotomy, and says, "The day is not far distant when the old-fashioned method, as erroneous as it is unsatisfactory, will be totally abolished in all cases of inflammation and congestion of internal organs having no circulatory connection with the skin, and when the practice of visceral phlebotomy will become the recognized orthodox method of depletion in such cases."

GALL-BLADDER AND DUCTS.

Papers on the surgery of the gall-bladder and ducts have been published by Czerny ¹¹²_{Mar.}; by Gaston, of Atlanta, Ga. ⁶¹_{Apr. 1}; by Richardson, of Boston ⁶¹_{June 17}; by Mayo, of Rochester, Minn. ⁶¹_{Aug. 24}; and by Kehr, of Halberstadt. ⁴_{Jan. 16 to May 1}

Four cases are recorded by Terrier ²_{Apr. 8} in which an external fistulous opening was established from the common bile-duct. In three the duct was so much distended as to form a distinct abdominal tumor; one of them was hopeless, the gall-bladder, cystic duct, and a portion of the liver having been removed for cancer. All were fatal.

In summing up his views on the present position of the surgery of the gall-bladder, Czerny ²_{Jan.}, says that the best incision is a rectangular one, the vertical limit lying along the linea alba, the horizontal one being carried directly outward on the right side at the level of the umbilicus, and that the dangers of operation for

gall-stones are much less serious than those for the removal of stone from the urinary bladder.

Wounds of the Gall-bladder.—In a case lately recorded ¹ a man was injured by being run over, the wheels passing over the lower part of his chest. The gall-bladder was ruptured. Bronchopneumonia set in, and after seventeen days laparotomy was performed and 10 ounces (310 grammes) of bile removed from the peritoneal cavity. The gall-bladder could not be reached owing to adhesions. Drainage and irrigation resulted in recovery. A biliary fistula persisted for three months, and then closed spontaneously.

Dalton ⁸⁰³ _{Apr.} reports 4 cases of laparotomy for stab-wound of the gall-bladder, liver, and stomach, with 3 recoveries and 1 death. The death occurred in the case of a man who had attempted suicide by stabbing. The knife had severed a large piece from the lower border of the left lobe of the liver, and free haemorrhage was taking place. The operation was not performed for five hours after the injury. During the operation a large quantity of clotted and fluid blood was washed from the cavity. The patient died upon the table, in spite of artificial respiration, stimulants, etc. Dalton thinks that we irrigate too much in laparotomies for recent injuries. He thinks that in this way septic matter is often forced farther into the belly-cavity.

Biliary Calculi.—In a discussion before the Paris Society of Surgery ¹⁴ _{Dec. 3, 11, '92} Terrier held that the gall-bladder was empty and generally atrophied in cases of gall-stone in the ductus choledochus, while it was distended in cases of cancer of the head of the pancreas affecting that duct. Reclus took the other side of the argument, and cited one or two cases in which the gall-bladder was distended by a stone in that duct. Terrier admitted this possible, but said it was of very rare occurrence.

Paulsen, of Copenhagen, ⁸³⁶ _{Feb. 4} calls attention to the infrequency of cholelithiasis in Denmark. Only 111 cases (30 men, 81 women) were treated for this affection during twenty years (1870–1890) in the general hospital at Copenhagen. During these years there were 9172 post-mortems performed (5448 men, 3724 women), and in only 347 (3.78 per cent.) of these were gall-stones found, namely, 127 men (2.34 per cent.) and 220 women (5.9 per cent.); 315 of these did not present any symptoms of gall-stone during life, although in some cases the stones were as large as walnuts.

Abbe² discusses the treatment of gall-stone obstruction. He states that occlusion of the common duct is not the gravest form of gall-stone disease. There is no point of the duct from which calculi have not been removed. Suture of the thickened walls is not difficult. With drainage provided for, the duct may be left open. When the stone is near the duodenal opening of the common duct, it is safest to remove it through an opening in the intestine. Cholelithotomy may sometimes be justifiable, but in general free incision is better and safer. Profound jaundice is not a contraindication of surgical interference in cases of obstruction from gall-stone. Sometimes the formation of an anastomosis between the gall-bladder and the bowel is to be desired. Abbe thinks the method of stitching with a double row of Lembert sutures preferable to the use of plates or buttons. To avoid cicatricial contraction of the orifice, the incisions made should each be an inch and a half in length. It is better to make the opening into the colon than into the small intestine. Bile is not now regarded as a necessary digestive secretion.

John Duncan's conclusions³⁶ from his experience in the surgical treatment of gall-stones are: 1. That when the stone lies in the gall-bladder or lightly impacted in the cyst-duct, cholecystotomy is a safe and easy operation. 2. That if the stone be impacted in the common duct, the gall-bladder is apt to be small, and such structures as the stomach and colon are prone to be adherent in awkward positions. 3. That in such cases it is safe to incise the duct and drain from the wound. 4. That, considering the perfect health enjoyed by patients with biliary fistula, there are few cases in which it would be justifiable to form a new route for the bile into the bowel.

Mygind, of Copenhagen, corresponding editor, reports⁶⁷³ 8 cases of operation for gall-stone performed by Iversen. Of these, 5 were simple cholecystotomies, and all were successful. One of the remaining 3 was a cholecystectomy, one was a pericystic abscess, and both died soon after operation. In the eighth case death occurred from tuberculosis a month afterward.

Successful cases of cholecystotomy are reported by Merkel, of Nuremberg⁸³⁶ (three cases, all in women); Spitzer, of Breslau¹¹⁸ (two cases, both women); Manseau, of Montreal,¹²² in a woman aged 35 (eight stones removed); Tuffier, of Paris¹⁴;

Iannelongue, of Bordeaux ¹⁸⁸_{June 23}; Boeckel, of Strasbourg, ¹⁶⁸_{Feb. 1} in a woman aged 55 (eighty-three stones removed); Rogers, of Clarksdale, Miss. ⁷⁴_{May} (three stones removed); Guinard and Jullien, of Paris ²⁴_{July 9}; Cheesman ⁵⁹_{Aug. 19}; Cartledge ²²⁴_{May 26, '93}; Prewitt ³⁸⁴_{July 16} (in this case an abscess in the abdominal wall communicated with the gall-bladder, from which about twenty-five stones were removed); T. G. Morton ⁹_{Mar. 18} (in this case the woman had never been jaundiced); Vance ²²⁷_{May 20}; J. E. Pickard ³⁹_{June}; C. S. Briggs ¹²⁰_{May} (one hundred and twenty-five stones removed); and W. A. Hall. ¹⁰⁵_{May 16} Treves ²²_{Apr. 6} reports a case of encysted gall-stones operated on with success. The patient had had no jaundice; the walls of the cyst, which contained nine gall-stones and much pus, were an inch thick. No bile escaped.

W. Mitchell Banks ¹⁸⁷_{July} reports five cases, with two recoveries and three deaths. In each of the latter an autopsy revealed the presence of malignant disease. Saunders ⁸⁵_{Mar.} gives three cases, with one recovery; one of the deaths occurred at the end of six days from exhaustion, the other in the sixth week from gastro-enteritis. A. T. Cabot, of Boston, ⁹⁹_{Dec. 8, '92} reports eight cases, with six recoveries and two deaths. He describes a hook devised by him for removing stones impacted in ducts, a hooked knife for opening the ducts, and a forceps for grasping the stones.

A. W. Mayo Robson ¹⁰⁷⁷_{Nov. 9, '92} advises, in cases of cholelithiasis with "recurrent" gall-stones, the administration of turpentine in the following mixture: R. Ol. terebinthinæ, ℥v (0.32 gramme); mist. acaciæ, ʒss (16 grammes); sodæ sulpho-carb., gr. xx (1.3 grammes); spt. ætheris chlorici, ℥xv (1 gramme); aquæ menth. pip., ad ʒj (30 grammes). Fiat haust. ter in die sumend. This should be given periodically three or four times a year in small doses. The following are the indications for surgical interference: (a) Repeated attacks of biliary colic which, not yielding to medical treatment, are wearing out the patient's strength; (b) suppuration in the neighborhood of the gall-bladder, as in empyema of the gall-bladder, or in abscess of the liver associated with gall-stones; (c) dropsy of the gall-bladder; (d) obstructive jaundice when the common duct is occluded by gall-stones; (e) acute peritonitis starting in the region of the gall-bladder, where the previous history of the patient is suggestive of gall-stones; (f) intestinal obstruction dependent on occlusion by a large biliary concretion.

In a paper on the surgery of the gall-bladder and ducts, J. McFadden Gaston ⁶¹ speaks of Wölfler's modification of cholecystotomy, which consists in removing all abnormal accumulations and concretions from the sac, closing it with sutures and attaching it to the abdominal incision. This process is based upon the doubt as to the efficiency of suturing the tissues of the sac, and in case of yielding provides for the escape of bile through the intestinal wound. He states that in the event of failure to effect an outlet for the bile through the common duct, then cholecystenterostomy is clearly indicated. The nearer the anastomosis is made to the duodenum the better.

Cholecystectomy.—Michaux ⁹¹ reports that he has performed cholecystectomy for biliary calculi upon six women and two men with success. Some of the cases presented much obscurity in diagnosis. He details the usual method of procedure, and says that even when the cystic duct is securely tied a flow of bile is so apt to occur that he always leaves a drain of iodoform gauze to lead it to the surface.

Successful cases of cholecystectomy have been recorded by R. Frank, of Vienna ⁵⁷; Schwartz, of Paris ¹⁴; Monod, of Paris ¹⁴; Posadas, of Buenos Ayres ⁹²⁵; and Allard, of Charleroi. ²⁷⁰ The youngest of the patients was Allard's, a woman aged 33 years, and the oldest was Schwartz's, a woman aged 51 years; two of the patients were men, aged respectively 40 and 44 years. Schwartz ¹⁰⁶⁰ reports an ideal cholecystectomy in a woman aged 51 years. The gall-bladder was found filled with calculi and attached to the liver by a pedicle, the elongated and obliterated cystic duct; this was tied, divided, and the end touched with the thermo-cautery. An excellent recovery ensued.

Bile-ducts.—At the New York Surgical Society, January 25th, ⁹⁶ Kammerer presented a woman, aged 30 years, upon whom he had operated for symptoms which indicated obstruction of the biliary ducts. The only lesions found at the operation were extensive adhesions between the gall-bladder and the transverse colon, the omentum and the pylorus. The patient made a good recovery, and her symptoms disappeared.

F. Terrier, of Paris, ⁹¹ discusses cases of retention of bile where the seat of the trouble is situated in the ductus communis choledochus. He has collected seventeen cases previously reported,

giving their detailed histories, with the operation performed. The mortality in these cases is 17.64 per cent.

Küster¹, removed by choledotomy two concrements from the common duct. The incision into the duct was closed with catgut and the finest silk sutures. In spite of a brisk secondary hæmorrhage on the eleventh day, making it necessary to reopen the wound entirely, the patient made a rapid recovery.

In a case reported by Reclus,¹⁰⁰ a man, aged 36 years, had retention of bile by obstruction of the common duct, with icterus, general pruritus, and albuminuria. The abdomen was opened, and the duct felt to be occluded by a calculus; as this lay too deep to be extracted by incision, the liver being greatly enlarged, a communication was made between the gall-bladder and the intestine. All the symptoms at once disappeared, and the man recovered well, although on the third day he had a violent chill, with a temperature of 104° F. (40° C.), and another on the fourth day.

Billroth, of Vienna,⁵⁷ reports a case in which he opened the ductus choledochus for gall-stone, thinking it was the gall-bladder. At the post-mortem, seven days later, the gall-bladder was found to be very small and shriveled, while the ductus choledochus was enormously dilated.

Prengueber, of Paris,¹⁴ reports a unique case of cancer of the ductus communis choledochus at its junction with the duodenum, in a woman aged 78 years. Long-continued jaundice, with a distended gall-bladder and some pain, favored the diagnosis of gall-stone, and the abdomen was opened with this idea. The gall-bladder was opened and over 4 ounces (124 grammes) of a dirty, slightly yellowish, mucous liquid, with a sediment of biliary salts, were withdrawn. The walls of the gall-bladder were coated with biliary sediment. Neither stone nor obstruction was found. Believing that the obstruction to the flow of bile was caused by the thick deposit of bile-salts, the gall-bladder was thoroughly cleaned and stitched to the abdominal wall. The patient reacted well after the operation, and by the third day bile was flowing freely through the fistula and the jaundice was diminishing. The woman progressed favorably for two weeks and a half, when she heard of her husband's death. From that time she ceased eating, and gradually sank until she died, one week later. The autopsy revealed a small cancer at the junction of the ductus communis

and the duodenum. No secondary nodules could be found in any organ.

Cholecystenterostomy. — J. Rosenstirn, of San Francisco, Cal., ⁷ reports an unsuccessful case of cholecystenterostomy, where the gall-bladder had failed to unite with the duodenum. The patient lived several weeks.

In a case reported by Macdonald, of Toronto, ¹¹³⁴ Murphy's buttons (see p. C-54) were used to make an anastomosis between the gall-bladder and the duodenum. The patient, a widow aged 57 years, had been for four or five years a sufferer from obstructive jaundice, and was in a state of intense cholæmia; she died of peritonitis on the eighth day. The contents of the gall-bladder and intestine had escaped into the peritoneal cavity, and it would seem that the fatal result might fairly be charged, in part at least, to the method employed. W. J. and C. H. Mayo ¹⁰⁵ report a case in which this device was used with success.

James F. W. Ross ³⁹ reports a case of cholecystenterostomy for a small malignant growth of the common duct. Cholecystotomy was first performed, but, upon the patient complaining bitterly of the fistulous opening, an attempt was made to produce an anastomotic opening between the duodenum and the gall-bladder by means of the elastic ligature, after Gaston's method. The patient died of a slow but sure haemorrhage, which came from the liver and escaped through the abdominal opening. At the post-mortem the duodenum was found adherent to the gall-bladder. On inspection of the interior of the gall-bladder an opening was found through the wall among dense adhesions in the peritoneal cavity. This had evidently been made by the attempts to establish a communication about two weeks after the operation.

Ross states that he prefers direct incision and direct suture in these cases to anastomosis. When the common duct is obstructed by a malignant growth, he advises simple cholecystotomy and not anastomosis, and in cases of obstruction of the common duct by impacted gall-stone he prefers at first cholecystotomy, in order to drain the gall-bladder and allow the enormously-distended gall-ducts to become diminished in size; at some later time cholecystenterostomy may be attempted. Ross concludes his paper by quoting Gaston, who gives credit to Nüssbaum for first suggesting operation for the relief of occlusion of the common bile-duct by

conveying the bile into the intestinal canal through an artificial opening between the gall-bladder and the intestine, and gives von Winiwarter credit for having performed the first operation upon a human being. Ross gives a table of thirteen reported cases: Von Winiwarter, 1880; Mownastyriski, June, 1887; Kappeler, July, 1887; Fritsche, 1888; Socin, Bardenheuer, Robson, 1889; Terrier, 1889; Courvoisier, Helferich, 1892; Chavasse, 1892; Körte, J. F. W. Ross, 1893.

M. H. Richardson, of Boston,⁹⁹ states that it is seldom possible to cure or even to relieve malignant diseases involving the gall-bladder or gall-ducts; that, with a few exceptions, operations are of questionable value in most cases of chronic obstruction to the bile-flow from causes other than stone. Operations should not be undertaken until every means at our command to make a diagnosis has been exhausted. Unnecessary explorations should be avoided. Cholecystectomy is desirable where the gall-bladder can be easily separated from the adjacent structures. It lessens the danger of the operation and shortens convalescence. Operations upon the hepatic and common ducts are indicated when stones become hopelessly impacted in either. Cholecystenterostomy is employed in chronic organic, non-calculus obstruction, where we must expect fatal cholæmia. Anastomosis between the gall-bladder and duodenum is preferable, though it may be made with the colon, or even the common duct may be isolated and inserted into the duodenum. In 14 operations upon the gall-bladder and ducts the author had had 2 deaths,—1 from avoidable sepsis and 1 from hæmorrhage.

STOMACH.

Landerer, of Leipzig,³⁴ Sept. 26 reports three cases of intense gastralgia with vomiting and epigastric tenderness. In the first case, a band of adhesion was found between the parietal peritoneum and the stomach three cubic centimetres by eight cubic centimetres. The patient recovered immediately after its removal. In the second case, the stomach was found adherent to the left lobe of the liver, and recovery took place after breaking up the adhesions. In the third, a small umbilical hernia was found, to which a section of the stomach as large as a small apple was tightly adherent. All symptoms disappeared on freeing the stomach and stitching up the hernial ring. In all of these three cases it was noted that

mechanical movement of the stomach by movements of the body or washing out the stomach brought on intense pain, which lasted for a long time. These cases had been treated for months as neuroses of the stomach, and Landerer wishes to point out that when pain is produced in the stomach from movement of the viscera a mechanical fixation of the stomach should be thought of.

Tuholske⁹,_{Mar. 11} discusses the treatment of pyloric obstruction, believing that with early diagnosis and improved technique we may look for better results than those hitherto recorded. He advocates gastro-enterostomy, and later removal of the diseased part, giving the history of a case in which this plan was adopted by him with success. Defontaine⁹,_{July 20} reports two cases of pylorectomy for carcinoma, which rapidly recovered and experienced great relief.

The question of surgical interference in cases of perforating ulcer of the stomach has been discussed by Romme,¹⁶⁴,_{Jan. 12} who thinks it indicated, and looks for a time when such a course may be the rule even before perforation has occurred. One instance of success, in a man aged 41, has been reported by Kriege⁴,_{Dec. 5, 1922} from Heusner's clinic. Haward,²,_{May} in a woman aged 26, found excision of the ulcer impossible, and sutured its edges to those of the abdominal wound; the patient died of abscess of the lung six weeks later. A remarkable case is reported by Gilford,²,_{May} in a female, aged 20, who had perforation with great shock; the abdomen was opened, and the ulcer found and sutured. Creolin solution was used for washing out the peritoneum, and caused some symptoms of constitutional disturbance; after this there was a double parotitis, and later a gastrostomy was performed. Four days later septic pneumonia set in, with diarrhoea; but this subsided, and she did well until an attempt was made to close the stomach-wound, and an abscess-cavity was opened. Next day she died in collapse.

Barling²,_{June 17, Sept.} records two fatal cases and one success; the latter was in a woman, aged 29, in whom perforation had taken place three weeks before the operation; the omentum was adherent to the abdominal wall, and through a mass of granulation tissue a pus-cavity was reached, which was drained. In spite of an attack of phlebitis in each leg, the patient recovered perfectly. Barling advocates thorough flushing of the peritoneum, unless cavities containing pus or other fluids are found, when, he thinks, they should be carefully sponged, lest other regions be infected.

Haslam, of Birmingham, ⁸⁰ discussing this subject, says that cases of perforation, due to simple ulcer, group themselves into three classes: 1. Where no adhesions have formed around the base of the ulcer, so that the contents of the organ pass at once and freely into the peritoneal cavity. In this group the perforation is usually found on the anterior surface of the stomach. 2. Where adhesions have formed between the stomach and some adjacent organ, the leakage causing a localized peritonitis, the resulting suppurations being shut off from the rest of the peritoneum. 3. Those rare cases where adhesions form between the stomach and some hollow viscus or serous cavity and perforation opens, for instance, the colon, pleura, or pericardium.

In looking over the records of the first group, he finds that the onset is always sudden, no matter what the antecedent symptoms may have been. Shock is present in greater or less degree. Vomiting, though frequent, was not constant. Abdominal pain and tenderness, increased by pressure, were nearly always present. Abdominal rigidity in the early stage and distension later on were frequently noted. The duration of the cases varied from seven hours to five days, most of them terminating under twenty-four hours. When, therefore, we consider that the chances of recovery after perforation are practically *nil*, an attempt to place the patient in a more favorable position by operation seems justifiable. The technique of such an operation is as follows: Every means must be taken to diminish the shock it will necessarily cause. The incision is made above the umbilicus, just to the left of the middle line, so as to miss the falciform ligament. In searching for the perforation it must be remembered that the anatomically anterior surface—the portion between the gastro-hepatic omentum and the great omentum—is only anterior in the undisturbed condition of the organ, and that it becomes practically an upper surface, when the stomach is distended and its position altered. Consequently the portion of the organ met with on opening the abdomen will be at no great distance above the greater curvature, a position where perforation seldom occurs. The finger must be carried along this surface upward and to the back, until the position of the anterior surface near the lesser curvature is found; here, experience teaches us, ulcers more frequently perforate. Having found the perforation, the next step should be to completely remove the contents of

the stomach, either by passing a tube down the œsophagus while the perforation is kept closed, or, if the ulcer is sufficiently large, through the perforation itself. The advantages of clearing the stomach are evident when we remember that shock stops digestion, and that the half-digested food will, in the course of time, cause movement in the stomach-wall or set up vomiting, thus interfering with the complete scab so necessary for repair. Closure of the perforation without the removal of the ulcer and its indurated base seems the most satisfactory plan of treatment. Lembert sutures should be passed outside of the area of induration, so as to get a good hold.

Next comes the flushing of the peritoneum, and here the question will arise as to whether it will be necessary to drain the pelvis. If the operator decide in the affirmative, the necessary incision should be made at this stage, as it will facilitate the more thorough flushing of the peritoneum. This washing out is the most important step in the operation, and one that must be persevered in as long as the patient can stand it, as the chief cause of failure after operation has been suppurative peritonitis. All excess of fluid is then removed, the drainage-tubes inserted, and the abdominal wounds closed in the usual way. He reports one case followed by death in forty-five hours after operation.

R. A. Stirling²⁸⁵, June 16, reports a case of perforating ulcer of the stomach, with escape of its contents into the abdominal cavity. Laparotomy was performed twenty-four hours after the rupture. Peritonitis was well marked, and proved fatal. Van Noorden⁴⁵¹, July, reports from Mikulicz's clinic five cases of gastrotomy performed according to Witzel's method, the results of which are as good as those reported by Witzel himself. Reclus⁵, May, reports a successful case of gastro-enterostomy in a woman, 51 years of age, for cancer of the pylorus.

In a case of gastro-ectasis from stenosis of the pylorus, it is claimed⁴⁵¹ that gastro-enterostomy, performed by Ribas y Perdigó, of Barcelona, effected "a complete cure of the disease." The man may have experienced great relief, but it seems as if the above statement was somewhat oversanguine.

Pollossen, of Lyons,²¹¹ April 24, reports a successful case of excision of the pylorus for cancer, in a man aged 32 years.

A case of gastric fistula opening at the right loin is reported

by Spisharny.²¹ The patient was a girl, 18 years old, who had had a perityphlitis two years previously, followed by abscesses about the navel and in the lumbar region. Two fistulæ found in the right loin were laid in one, and after partial resection of the twelfth rib the canal was dilated and traced inward and upward. Food was found in the dressings when they were changed. Healing took place under the use of tampons. Of sixty-one other cases collected by the author, none opened in the loin.

Czerny and W. Rindfleisch³³⁶ report from the Heidelberg clinic 19 resections of the stomach, of which 7 died; 20 gastro-enterostomies, of which 8 died,—2 of peritonitis, 2 from pneumonia, and 4 from collapse. Von Hacker⁸ Nov. 8, Dec. 1, '92 gives a very interesting series of cases: 3 resections of the stomach, all successful,—2 were for carcinoma, 1 for lympho-sarcoma, in which more than two-thirds of the viscus were removed; 4 gastro-enterostomies,—1 for stenosis of the pylorus from gastric ulcer, successful; 1 for carcinoma of the pylorus, with relief; 1 for benign stenosis of the pylorus, with cholelithiasis, relieved by operation with cholecystotomy; and 1 for carcinoma of the pylorus, in which death occurred on the sixth day from catarrhal pneumonia and gangrene of the lung. Roux, of Lausanne, and Doyen, of Rheims, have also given¹⁴ valuable records of clinical experience in this department of surgery.

E. Rouse-Rouse⁶, reports a case in which a woman, aged 64 years, suffering from melancholia, swallowed an iron spoon four and a half inches long and an inch wide at the bowl. No symptoms developed for three weeks, when a swelling appeared two inches below and to the left of the umbilicus. There were no symptoms of obstruction or peritonitis. Operation was refused. For several weeks she remained in the same condition, and then the skin over the tumor began to redden and became hard and inflamed, until suddenly the abdominal wall gave way, and the handle of the spoon presented with a free discharge of pus. This opening was finally dilated and the whole spoon removed. Six days afterward the patient went into collapse and died. The post-mortem showed a fistulous opening in the large intestine at the junction of the transverse and descending colon.

A case is reported by Caven and Weir,³⁹ in which a lunatic, aged 23, swallowed a knife, fork, and spoon; with the exception of uneasiness twice occurring for short periods, he made no com-

plaints, but the abdomen became gradually more and more distended, and death ensued ninety-two days later. At the autopsy about 2 gallons (8 litres) of sero-fibrinous liquid were found in the abdomen ; strong adhesions existed between the stomach, ileum, and transverse colon, the foreign bodies being lodged partly in each portion of the gut ; the duodenum was perforated by the bowl of the spoon into the peritoneal cavity. A four-sided piece of glass was lodged in the trachea just at its bifurcation ; it had evidently been there for some time, but had produced no symptoms.

Cant, of Lincoln,², reports a case in which a female lunatic, aged 68, swallowed a large bone-handled razor ; six days afterward it was removed by gastrotomy. The patient was nourished by the rectum for some days, and did well except for occasional slight vomiting of blood, until the sixth day, when collapse ensued and proved fatal. The autopsy disclosed no peritonitis, but extensive mitral disease of the heart ; there was a small abscess of the abdominal wall. Lawson, of Hull,² mentions a case in which he removed from the stomach of an insane man an iron skewer having engaged in its eye a piece of the stem of a clay pipe, with a fragment of the bowl attached. The patient was still living at the time of the report, the operation having been done five years previously.

Two cases of stab wounds of the stomach are reported by Repetto.³³⁶ In one, that of a man 33 years old, there was some shock ; food, blood, and bile had been vomited. The abdomen was opened, and after a long search a cut one centimetre long was found in the stomach-wall ; it was closed with eight Lambert-Czerny sutures, and the man made a rapid recovery. In the other case, that of a man of 27, there was free bleeding from two wounds of the mesentery, and much clot between its layers. No wound of the gut was detected until after death, which occurred in forty hours, when both the anterior and posterior walls of the stomach were found to have been perforated ; the neighboring peritoneum was thickened, and rough with adhesive exudate. Douglas's space was full of clot, and the intestines were likewise coated, but there was no inflammation.

INTESTINES.

In order to determine which is the upper and which the lower end of the divided intestine, Ruth, of Keokuk, Ia.,⁵⁹ points out

that a simple and sure way is to hold them in place as if they were parts of a loop, with the sides of the mesentery right and left; then to follow the mesentery back to its posterior attachment. If the finger remain on the same side, the upper end in the hand is the gastric and the lower the rectal; if it should cross to the opposite side, there is a half-twist; if it should go across and then back again, there is a complete volvulus.

Park, of Buffalo,⁶¹ calls attention to the fact that the bacillus coli communis is not always harmless, but may pass the intestinal mucosa and become a source of mischief. Thus, it may give rise to lesions of the liver or gall-bladder, or to peritonitis; it may find its way into the kidneys or urinary bladder, or even to the endocardium, pleura, synovial membranes, meninges, or lungs. Post-operative septicæmia, or enterosepsis, may be due to its migrations.

A case of acquired umbilical faecal fistula in a girl 2 years old has been reported by D. Ramsay Smith, of Edinburgh,³⁸ and was interpreted by him as one either of patent omphalo-mesenteric duct, or a Meckel diverticulum. In the discussion other cases were cited, and this explanation was opposed by Boyd and Struthers.

F. Kyewski⁸³⁶, reports two cases of abdominal contusion from Kosinski's clinic, in both of which rupture of the bowel took place. Laparotomy was performed and the injury sutured, and both recovered.

Reverdin⁵ has reported a case of epithelioma of the transverse colon, in a woman 58 years of age, in which resection of the gut, with the formation of an artificial anus, gave complete relief; four months afterward patient was gaining in health and weight.

Sachs, of Mulhouse,³⁸⁰ reports a case of successful extirpation of the cæcum for tuberculous disease, in a woman 41 years old, and refers to a number of instances in the practice of other surgeons, from which it would appear that the mortality was 15.3 per cent. But he says, justly, that there may have been many unrecorded failures. Körte⁴ has recorded a successful resection of the cæcum and several inches of the colon for carcinoma; the patient remained well nearly two years afterward. A fatal case is reported by Huntington, of Sacramento, Cal.¹⁴⁷ In another instance, recorded by Frank⁵⁷ as occurring at Albert's clinic, the patient, a man aged 36, had gained several pounds in weight, and was in excellent health at the end of six months. Robson², has

effected the relief of an ulcerative colitis by inguinal colotomy, the bowel below the opening being subsequently regularly irrigated with boracic solution. Our corresponding editor, Mygind, of Copenhagen, reports⁶³ a case in which Bloch made a successful exsection of a cylindrical epithelial carcinoma of the sigmoid flexure, in a man aged 36. The bowel was brought outside the abdomen, and an artificial anus made; the resection was done on the thirtieth day, and the orifice closed three months later. Gersuny⁵⁷, recommends, in cases of rectal carcinoma where the sphincter must be removed with the growth, and in such as require the formation of an artificial anus, that the gut be twisted on itself until it strongly resists the introduction of the finger. The object of so doing is to prevent subsequent incontinence of fæces when the bowel-wall contains no thickness of muscular layer sufficient for the employment of von Hacker's plan of making an artificial sphincter.

Intestinal Obstruction.—Gangolphe, of Lyons,¹⁰⁰ points out the importance of sero-sanguineous effusions into the peritoneal cavity, as indicating, along with the other symptoms of obstruction, that there is strangulation of the bowel demanding immediate operative interference. He bases this view upon observations in the human subject, and upon experiments on animals; he regards the effusion as analogous to that so often seen in the sac in strangulated hernia, and as due to like cause.

Prince, of Springfield,⁹ records the case of a girl, 4 years and 3 months of age, who had complete obstruction of the bowel by a curiously-shaped Meckel's diverticulum. The bowel was nearly separated when an abdominal section was made, on the sixth day; the division was completed and an end-to-end anastomosis effected, but the child died two hours afterward, from shock. From the account it would appear that the fatal result was due wholly to the delay in obtaining surgical aid.

Reclus, of Paris,¹⁰⁰ first tries medication and washing out the bowel; next, if the situation is such that asepsis is possible, he advises laparotomy; but if the patient is incapable of withstanding a long operation, and the locality is such that peritonitis by inoculation is imminent, he advises the formation of a false anus above the seat of obstruction by the use of cocaine. If colotomy may allow more patients to die, surely, of itself, it kills many less.

Thiéry, of Paris,⁷ calls attention to the harmful effect of opium in intestinal obstruction. He reports a case of acute intestinal obstruction, in a vigorous boy of 19 years, due to a fibrous band. The abdomen was opened, the band divided, and the patient did well until the fourth day, when, suddenly, vomiting and the symptoms of obstruction reappeared. The wound was perfectly healthy. In searching for the cause of the symptoms he found that the patient had received about 5 grains (0.32 gramme) of opium during the four days after operation, contrary to his instructions. Castor-oil was administered, in drachm (4 grammes) doses every half-hour, until the bowels were moved, when the symptoms disappeared and the patient again entered on convalescence.

Lawford Knaggs, of Leeds,⁸ discusses the use of abdominal taxis in the early stage of complete intestinal obstruction, and says that taxis is only intended to take the same position in the treatment of internal strangulation or obstruction that it has long occupied in cases of visible hernia. He quotes Hutchinson's remark, "It is for the *early* use of anæsthetics in all cases, and abdominal taxis only in appropriate ones, that I plead." The occurrence of spontaneous reduction of a loop of bowel that has been twisted, or nipped under a band or in an aperture, is a strong argument in favor of abdominal taxis; and if, in the early stage of obstruction in similar cases, this is thoroughly and systematically performed, in accordance with Hutchinson's suggestion, and "the body inverted so that the intestines drag up by their weight," there is great probability that the entrapped or twisted bowel may be released. When strangulation has led to gangrene of the knuckle or to gangrenous ulceration at the site of the constriction, it is very obvious that taxis is unsuitable. The early period, before the coats of the bowel have had time to suffer and before distension has become very marked, is most suitable for its employment. At this stage it can hardly do harm, and will not interfere with the success of a subsequent operation should it fail. If the rule of practice were to open the abdomen at once when an acute obstruction due to a nipped or twisted bowel was diagnosed, then certainly a greater measure of success would result from the operation; but many cases would have been operated upon that would have recovered if they had been left alone. On the other hand, though the conditions seen at many laparotomies are such that taxis must

obviously have been futile if it had been employed at the time when the operation was undertaken, yet in their commencement these entanglements are often very simple, and probably quite capable of rectification by simple means. A successful operation is not of necessity good surgery; an operation, however successful, is an opprobrium to surgery if it is unnecessary. He reports an unsuccessful case of obstruction in a man of 58 years. The patient's bowels had not been moved for a week and no flatus had passed, and he was in a collapsed condition at the time the abdomen was opened. The small intestine was found nipped in the left femoral ring; but the obstruction did not depend upon strangulation at the ring, but on the acute kinking and stretching of the coil whose end had been caught. It was found impossible to bring the nipped end of the intestine outside of the abdomen on account of the shortness of its mesentery; and doubtless this accounts for the involved loop being so stretched and kinked at the ring where it was fixed. The patient never rallied from collapse, and died twenty-four hours after the operation, although the bowels acted several times before death.

Lucas-Championnière^{16 Aug. 1} has recorded six cases showing the obscurity of diagnosis of intestinal obstruction following operations on the abdomen. Bands, adhesions, or paresis of the gut-wall would seem to be the chief sources of trouble of this kind. In one case the bowel was compressed by a mass of effused blood. In every one of these instances the symptoms occurred on the eighth day after operation.

Lloyd Smith, of London, reports a case of intestinal obstruction in a boy aged 16 years. On opening the abdomen a fine, whipcord-like band of tissue was found, one end of which was attached to the large intestine and the other to the small, and under it part of the small intestine was bound down. There was no strangulation, only a compression and acute bending of the bowel. After division and removal of the band the abdomen was closed, and the boy made a rapid recovery. Franklin, of Leicester,^{6 Sept. 22} reports a successful operation for intestinal obstruction in a man aged 32 years. The obstruction was caused by a band of lymph, the result of a blow on the abdomen from a fall eight days before the operation.

A case of intestinal obstruction due to a band, probably the

result of an inflammatory adhesion, is recorded by Howard Marsh.⁶ The patient was a boy of 14 years; the symptoms had lasted five days, becoming more and more urgent. Cœliotomy was performed and the band was found, but gave way before it could be exposed. Immediate relief ensued, and the boy recovered rapidly and completely. Reclus, of Paris,¹⁰⁰ May 18, reports a case of obstruction of the bowels, in a woman of 30 years, due to a band of adhesion a little over an inch in length, so thick and tenacious that he was unable to rupture it with his hands, and had to resort to the scissors. The cut ends did not bleed a drop. The patient made a quick recovery.

In a case reported by Keen⁷² April, a woman, aged 45 years, presented symptoms of intestinal obstruction; cœliotomy was performed, and the condition found to be due to paresis of the walls of the entire colon. By means of incisions an enormous quantity of gas was released; there was much shock, and the patient was for several days extremely ill, but ultimately recovery ensued. Much benefit was derived from the hypodermatic use of strychnia, and from repeated doses of Epsom salts.

Chas. K. Briddon, of New York,⁹³ Jan. reports a case of ileus in a girl of 15 years, due to an axial rotation of a large lipoma growing in the mesentery. The tumor was removed through an incision along the border of the right rectus muscle, and the bowel easily untwisted. The patient made a quick recovery.

Nicolaysen, of Christiania,² July 21, 1892, reports a case of volvulus of the lower part of the ileum, with further compression of the gut by an inflamed vermiform appendix, in a man aged 27 years. An exploratory cœliotomy was performed, the bowel untwisted, and the appendix removed. The man recovered well, but within a year afterward had two severe attacks of pain, with vomiting and obstruction, which, however, yielded to medical treatment; they were probably due either to a fresh twist or to adhesions. A fatal case of twist of the ileum, occurring after violent exercise, in a girl of 18 years, is reported by Pennington.⁹ Operation was unfortunately delayed until the patient was too much exhausted to react.

Hawkins, of London,² Oct. 22, 1892, mentions the case of a woman who died with symptoms of acute intestinal obstruction, after a slight blow on the abdomen. At the post-mortem a figure-of-8 twist of the gut behind the umbilicus was found, which unraveled itself

as soon as exposed. Stavely, of London,² relates a similar accident in a child of 5 years of age, in whom a slight blow on the abdomen while at play was followed by symptoms of acute intestinal obstruction and death in twenty-four hours. At the post-mortem a volvulus thirty inches from the pylorus was discovered.

G. R. Turner, of London,² reports a case of volvulus of the small intestine in a boy of 7 years, the result of a fall of twelve feet. The vomiting soon became faecal, and the abdomen was opened twenty-four hours after the fall. An entangled mass of intestines (ileum) was found to the left of the middle line; this was unraveled, and two collapsed, flattened parts, a foot and two feet in length, separated by about four feet of intervening intestine, were discovered. The collapsed gut at either end passed abruptly into the neighboring healthy intestine. The patient made an uninterrupted recovery.

Cases of volvulus of the sigmoid flexure, successfully relieved by means of abdominal section, have been reported by Mayo, of Rochester, Minn.,⁹⁶ in a woman aged 50 years, and by Ochsner, of Chicago,⁶¹ in a man aged 32 years. The treatment of this disorder has been discussed by McArdle,¹⁶ in connection with the report of a case in a young woman of 22 years. On operation, the descending colon and sigmoid were found distended and hypertrophied, and had to be emptied by incision; the mesocolon showed a state of solid œdema. Perfect recovery took place. Early operation, relief of distension of the large intestine by longitudinal incision, and free washing out of the contents by means of the long tube are urged.

Finney, of Baltimore,⁷⁶⁴ has reported a case of volvulus of the sigmoid flexure, in which the condition recurred three years after it had been relieved by cœliotomy: the recurrence was due to a band of adhesion between the scar of this operation and the gut. The abdomen was again opened, the band ligated close to each end and excised, and detorsion effected. The case did well, although the patient is, of course, not free from risk of a return of the trouble. Referring to the statistics of Braun, Halsted regards this case as only the second in which detorsion of a recurrent volvulus has been accomplished, and the first in which success has attended the procedure. In a case of intestinal obstruction following upon hepatic colic, in a woman aged 46, Terrillon¹⁰⁶⁹ per-

formed an exploratory cœliotomy, and found a portion of the small bowel blocked by a gall-stone two inches long and four inches in circumference. This was removed through an incision, which was then sutured; a good recovery ensued. The author has collated twenty-three similar cases, seven of which were successful.

Le Bec ¹⁰⁰ reports a case of intestinal obstruction, due to an enormous gall-stone, in a woman aged 52. Laparotomy was performed and the stone removed. The patient died on the fourth day from disease of the heart, without any symptoms of abdominal trouble. Körte ⁴ mentions a case of complete obstruction at the sigmoid flexure, by the arrest of a large gall-stone, in a man of 71 years; the bowel was exposed, opened, the stone removed, and the incision sutured, with complete success.

St. Lawrence Finny ⁶ reports a case of intestinal obstruction in a man 68 years of age. The patient four years previously sustained a left direct inguinal hernia, the result of lifting a heavy weight. Ten days previous to the operation obstinate constipation set in, followed by vomiting and pain in the abdomen; finally, the vomit became stercoraceous, and the abdomen was opened. No obstruction was found in the hernial opening, but a fibrous band held down the large intestine some inches from the cæcum. This was divided, when it was found that part of the bowel had intussuscepted. This was easily reduced and the abdomen closed. The patient's temperature never passed 99° F. (37.2° C.), and he was up on the twelfth day.

Barton, of Philadelphia, reports ⁹⁸ the case of a man, aged 27, who suffered from intestinal obstruction due to epithelioma at the ileo-cæcal valve, with intussusception; the abdomen was opened, the diseased portion of the gut was excised, and an artificial anus was established. The man's condition having greatly improved, an attempt was made to close the opening, after making an anastomosis between the ileum and the colon; but complete obstruction ensued, and death occurred on the fourth day. It was found that an old adhesion of the ileum in the left iliac fossa was the cause of the difficulty, the gut forming a tense band across the belly and constricting the part used for the anastomosis so as to shut off its circulation and cause it to slough. The sutures had held perfectly.

Wyeth, of New York, ¹⁰⁷⁵ reports an interesting case of

obstruction of the intestine, due to lumbricoid worms, in a man 24 years of age. The bowels had not moved for five days, and the abdomen was greatly distended. There was no fever, the pulse being 120. The abdomen was opened in the right iliac fossa, a loop of intestine caught up, and an artificial anus formed, through which a large quantity of gas, fluid, and ingested matter escaped. For several days lumbricoid worms were passed, one of which measured twelve inches. Three months later, as the fistula did not close, an end-to-end anastomosis was performed, with a resection of three inches of gut. When ready to return the gut to the abdomen, a hard, faecal mass was felt in the ileum, above the resected portion. Fearing the strain which would be brought on the sutures when the effort to dislodge this impaction of faeces was made, he decided to wall off the rest of the peritoneal cavity and keep the line of sutures in sight. This was done with a packing of iodoform gauze. The patient rallied and did well. On the fourth day the gauze was removed, and the sutured intestine was now entirely isolated by adhesion. The impaction was finally broken up on the eighth day, after repeated large enemata of warm water and olive-oil. The strain, however, was so great that the line of union in the sutured intestine gave way for one-fourth of an inch, and fluid faeces escaped at intervals for a week. This opening finally closed spontaneously, and patient recovered.

H. Cripps² proposes the treatment of complete obstruction of the large intestine by what he calls "temporary typhlotomy." When an incision has been made as for left inguinal colotomy, but the gut is not found distended at that point, he would close that opening and make another on the right side, over the cæcum; then, after stitching this portion of the bowel to the parietal peritoneum, a trocar and cannula may be passed in to allow of the escape of gas and faeces. For the cannula a rubber tube may be substituted, and left in place until it is decided whether the orifice shall be enlarged or closed by operation. He has employed this plan with success in two instances, which are detailed. Southam² reports two cases, and Lèche² one, in which it was adopted with advantage.

Intussusception.—R. A. Murray¹⁸⁷ calls attention to the importance of treating cases of intussusception on lines parallel to the treatment of hernia; if, in the more acute cases, reduction is not effected by a single rectal injection, abdominal section should

be at once performed. Shepherd, of Montreal, ⁶_{Nov. 19, '72} says that it is well first to arrest the peristaltic action of the bowels by the administration of opium, or even to give emetics. An attempt should then be made to force back the invaginated bowel, by means of air, hydrogen-gas, or water injected per rectum, while the patient is under an anæsthetic. If this fail, an abdominal section in the median line should immediately be done. He reports two cases in which the abdomen was opened; the first, a girl aged 6 years, recovered. The second, an infant of 7 months, in whom the whole of the large bowel and part of the ileum were invaginated in the rectum and protruded through the anus, died.

Bilton Pollard, of London, ⁶_{Oct. 15, '72} reports an interesting case of intussusception in a male child of 6 months. The tumor was felt in the right loin, and disappeared after the injection of a pint ($\frac{1}{2}$ litre) of water, with a pressure of three and a half feet. An hour afterward a small cylindrical tumor was found in the region of the cæcum, and, as the symptoms of intussusception had not abated, a median section was done, and the tumor turned out to be the ileo-cæcal valve, which was much swollen. The cæcum was returned, and the child made a good recovery. A case of ileo-colic intussusception in a male infant 8 months old, successfully treated by means of abdominal section, is reported by Lockwood ⁶_{June 3,}; and another, in a child 3 years of age, where "six to eight inches each of the ascending colon and ileum" were invaginated into the transverse colon, by Ochsner, of Chicago. ⁶¹_{July 20} A case of ileo-cæcal invagination in a man aged 23 years is reported, ⁸³⁹_{Dec. 19, '72} in which the condition followed immediately upon active purgation by medicine. An abdominal section was performed, and the intussusception, five inches in length, was withdrawn; the patient was markedly shocked, but made a good recovery.

Symonds, of Oxford, ²_{Mar. 22} reports an exceedingly interesting case of intussusception of a malignant growth of the large intestine, in a man aged 60 years. The tumor protruded from the anus, and at its apex the lumen of the gut was found surrounded by a ring of new growth about two inches in breadth, soft, pliable, and easily bleeding. Sutures were passed so as to shut off the peritoneal cavity and the growth then excised, the two mucous surfaces being brought completely in contact with silk sutures. The bowel was then returned into the rectum and pushed up as high as possible,

a tube, long enough to protrude at the anus, having been first inserted in the lumen of the gut. The patient recovered well from the operation, and was out of bed, when he was again seized with symptoms of obstruction. The abdomen was again opened, the sigmoid flexure drawn out, when the patient became faint and died on the table. The post-mortem showed that thorough union had taken place at the seat of the resection, and the bowel admitted the forefinger. Another stricture of malignant character was found eight inches below the ileo-cæcal valve, which only admitted the tip of the little finger. On its proximal side were found a date-stone, cherry-stone, potato-skins, orange- and apple-seeds, and a few small, dark, and hard gall-stones. The higher stricture was not suspected during life, and was evidently the cause of death.

Hulke, of London,⁶ reports a case of intussusception in a plumber aged 17. A laparotomy was performed. The lower part of the ileum was found to be firmly contracted into a hard cord-like object for a distance of three inches, the distal end of which was continuous with a ten-inch intussusception. After considerable difficulty the disengagement of the intussusception was effected, not, however, until three small rents were made in the peritoneal coat. These were stitched up with fine silk, and as the extricated bowel assumed a bright, florid-red hue, it was replaced in the abdomen and the incision closed. The patient died twenty-four hours after operation. The autopsy showed marks of a widely-diffused general peritonitis. The last three feet of the ileum were intensely congested, of a slaty hue, and coated with flakes of lymph. About a foot above the ileo-cæcal valve a polypus the size of a small plum was found attached to the mucosa by a rather wide base, the evident cause of the invagination. Hulke calls attention to the reddening of the gut after it was released,—the accepted sign that sloughs are absent,—and yet the post-mortem showed the bowel to be sloughy in patches.

PERITONEUM.

From a series of observations made in 28 abdominal sections Mironow⁵ found that the peritoneum when first opened was, in 21 instances, free from micrococci, while at the close of the operation they were absent in only 8 cases. These micro-organisms must have been introduced from without, presumably from the air,

or from the non-sterilized hair and beard of the operator. Although they caused no septic symptoms, there were in 11 of the cases marked elevations of temperature during the first weeks succeeding the operations. A. Wathélet,²⁹³ in a paper on the diagnosis of peritonitis, says that, in the majority of cases, peritoneal inflammation is due to germs finding their way out of the alimentary tract, or from the organs of reproduction. According to the researches of Laruelle,⁷⁹⁵ Fränkel,⁸ and Malvoz,⁴⁵⁷ the great majority of cases of intestinal origin are due to the bacillus coli communis, a constant intestinal parasite, while peritonitis, having its origin from the genital organs, is in the majority of cases due to the streptococcus pyogenes. Peritonitis of gonorrhœal origin (Wertheim), or caused by the diplococcus of pneumonia (Netter), or the staphylococcus pyogenes, is rare as compared to the two preceding varieties. Malvoz proposes to utilize the results furnished by bacteriological examination for medico-legal cases, and cites a fatal case of peritonitis in a woman, who had a lesion of the uterus following a miscarriage, and at the same time intestinal ulcers following acute enteritis. From the fact of the bacterium coli communis alone being present in the peritoneal exudate, he infers that the peritonitis was of intestinal origin. Wathélet reports a case of peritonitis in which death occurred with symptoms of double salpingitis. The bacteriological examination showed numerous colonies of streptococcus pyogenes and none of the bacillus coli communis. As the presence of the bacillus coli communis in peritoneal exudates has been attributed to post-mortem changes, he calls attention to the fact that in the case just noted the post-mortem was performed twenty-seven hours after death, and yet not a single intestinal bacterium could be demonstrated in the examination.

W. A. Meredith, of London,⁶ views the peritoneum as a large lymph-sac, and says that success in abdominal work depends largely upon the attainment of three main objects: (1) avoidance of the introduction within the serous cavity of any septic or potentially septic material; (2) avoidance of the infliction of any unnecessary injury to the peritoneum, whereby its vital properties may be impaired; (3) promotion of the subsequent removal, by natural or by artificial means, of any fluid remaining in the pelvic cavity at the conclusion of the operation. Natural means imply

the re-establishment of the renal and intestinal functions, while artificial means imply the drainage of the cavity with a glass tube. Meredith gives a brief summary of his abdominal sections during the past three and a half years, amounting to one hundred and eighty-three cases, in which the peritoneum was opened, with thirteen deaths.

Körte⁴ records two cases of suppurative peritonitis, one in a girl aged 13, the other in a man aged 58, treated with success by coeliotomy and drainage. He says¹³ _{Apr. 15} that within the last two years he has operated on 18 cases of this kind (14 men and 4 women), with 6 recoveries (4 men and 2 women). G. Barling, of Birmingham,² reports a case of localized suppurative peritonitis of obscure origin in a girl of 7. An abdominal section, with drainage for seven days, ended in recovery.

The treatment of tuberculous peritonitis by laparotomy has been quite extensively discussed. One of the most elaborate articles on this subject is by Roersch, of Liége.⁹¹ _{July 10} He finds the best results to have been obtained in the ascitic forms of the disease, acute, subacute, or chronic, and in adults, and gives detailed histories of 11 cases, 1 of which was fatal. Bienfait⁸⁶⁸ _{V. 2, No. 1} holds much the same ground, as does also Barber, of Los Angeles, Cal.⁴⁴ A very clear view of the matter is presented by Mauclaire¹⁶⁴ _{Feb. 9}; he gives first the division of Boulland into the miliary, ulcerative, and fibrous forms of the disease, but regards this as available more for medical than for surgical purposes. For the latter, the classification of Pic as modified by Aldibert seems to him preferable; in this the disease is assigned three chief forms: the ascitic, the dry fibrous, and the ulcerative; the first of these is again divided into the acute, subacute, and chronic, this last being either generalized or encysted. The second, the dry fibrous, may be merely dry, or adhesive also. The ulcerative form may be either dry or suppurative, and in the latter case either generalized or encysted in one or several loculi. In the ascitic forms surgical interference is most successful in chronic cases; it gives relief in the subacute, and it affords the only chance in the acute, although in these last the results have so far been very unfavorable. Of the dry fibrous forms, the merely dry should always be operated upon, but the adhesive process is itself to be regarded as a curative one, and need only be dealt with in case of intense pain or symptoms

of intestinal occlusion, when the utmost caution is demanded in the procedure. In the various subdivisions of the ulcerative form the results of laparotomy have been very discouraging, the mortality, according to Aldibert, being as high as 75 per cent. When occlusion of the intestine occurs, exploratory operation may be imperative. The chief contra-indications to operation, in any case, are: the generalization of the lesions; the existence of profound systemic infection, and therefore of small resisting power. Conitzer² would distinguish between the exudative and the cicatrizing forms of the disease, prospects from operation being much more favorable in the former. Pic¹⁷ confirms these statements.

Mader¹⁶⁹ regards the curative effect of laparotomy upon tuberculous peritonitis as due partly to the access of air, partly to the complete evacuation of the fluid, and partly to the pressure of the dressings keeping the peritoneal surfaces together. He therefore seeks to attain these objects by the use of a trocar and cannula, by very firm pressure with a compress and bandage, by closely restricting the amount of liquid in food and drink taken, and by keeping the intestines at rest by means of opiates.

Von Mosetig-Moorhof,²⁹⁷ adopting Caspersohn's view, that the admission of atmospheric air was the cause of the benefit from laparotomy in these cases, employed an apparatus for forcing sterilized air into the abdominal cavity of a boy, 4 years old, whose testicle had been removed for tuberculous disease, the ascitic fluid having been thoroughly evacuated through the operation wound and inguinal canal. The air was completely absorbed in two days, and six months later the boy was well and hearty.

Riva⁹³⁴ performs paracentesis, evacuates the liquid thoroughly, and then fills the cavity with distilled water, admitting no air with it. This injection is repeated until the water comes away without a trace of albumen. It is claimed that 13 cases have been thus treated with success. Hawkins⁹⁶ contrasts the results in 100 cases subjected to medical treatment alone with those in 112 in which the abdomen was opened; he finds that they differ very slightly in favor of operation, if at all. The procedure seems to have done no harm; and it certainly affords a better opportunity for the complete removal of the ascitic fluid, as well as of lymph and caseous products. Successful cases are reported by Courtin¹⁴; by Laennec¹²⁷; Mixter, of Boston⁹⁹; Raymond, July 2, Knaggs,² Nov. 19,

and Poncet.⁶ A. Lapthorn Smith²⁸² records an interesting case, in which a woman, aged 32, recovered well from the operation, but two weeks and a half afterward was attacked with haemorrhage from the bowels, which proved fatal in a week.

Phocas, of Lille,³¹ discusses the treatment of tuberculous peritonitis of children by laparotomy. Of 118 such cases collected by him, 82 were successful, 36 fatal, either by generalization of the disease or as a result of the operation. He recognizes the difficulty of diagnosis, but asserts that if the ascites is not of tuberculous origin success is almost certain, while if it is so there is at least a respite, an amelioration, which may afford an opportunity for the effectual correction of the systemic taint.

In the treatment of tuberculous peritonitis as is well known, benefit is often derived from the opening and washing out of the abdominal cavity. For this it has been proposed by Duran,²¹¹ by Mosetig-Moorhof,⁶ and by Nolen² to make a simple puncture, and through this to force in sterilized air by means of proper apparatus. Very satisfactory results are claimed for this method.

Arcelaschi⁵⁸⁹, advocates laparotomy in ascites not dependent upon renal or cardiac disease; he thinks it especially indicated in tuberculous cases, in simple chronic peritonitis, in cases of tumor, and sometimes in cirrhosis of the liver. The operation may be of value merely as exploratory; but it may also be curative, whether by the formation of adhesions, by the diminution of pressure and of abdominal tension, by the reflex effect of the operative traumatism, or possibly by a moral or psychical influence. With modern methods, such a procedure is devoid of difficulty or danger. Thorough drainage should be provided for; in tuberculous cases iodoform may be dusted over the peritoneal surface. When the ascitic fluid is in small amount, the wound may be closed without drainage.

Bilton Pollard⁶ reports an interesting case of chronic peritonitis with intestinal obstruction in a man aged 34. Greig-Smith's operation of repeated tappings of the intestine was resorted to with the ultimate recovery of the patient. Faulkner⁶ urges the value of paracentesis in the treatment of ascites, giving a tabulated epitome of twenty-one operations upon 12 patients performed by him in 1891.

G. A. Sutherland⁶ reports two cases of non-suppurative

traumatic peritonitis in children. The first was a child of 12 months, in whom peritonitis was brought on by tapping a congenital hydrocele of the right side four weeks previously. The child was well nourished, but distinctly anaemic. The abdomen was very distended, tender, and tense. There was absolute dullness on the right side, extending from the spine to within a finger's breadth of the middle line, and from the ribs nearly to the pubis. A large right-sided hydrocele was first tapped, and 4 ounces (124 grammes) of blood-stained serum drawn off. The abdominal swelling was not decreased. The hydrocele quickly refilled, the anaemia increased, and the temperature rose to 104° F. (40° C.). Accordingly, the abdomen was opened, two days later, in the middle of the right linea semilunaris, and a large quantity of blood-stained fluid evacuated. On passing in the finger, a soft, fluctuating mass was felt in the iliac fossa, the wall of which gave way, and another rush of similar fluid took place, followed by a complete disappearance of the hydrocele. The finger passed easily from the peritoneal cavity into the right tunica vaginalis. The small intestine presented at the wound, and, with the exception of slight congestion, seemed healthy. The child made a good recovery.

The second case was a girl, aged 8, who was knocked down and run over by a cab, the wheel passing over the abdomen. She complained of great pain in the back and epigastrium, and lay in bed with her thighs flexed on the abdomen. On the next day the epigastrium was distended and tender, the breathing entirely thoracic. Thirst, and vomiting after eating, were prominent symptoms. Three weeks later the pain and vomiting had ceased, but the temperature ranged from 100° to 101° F. (37.8° to 38.3° C.). A distinct swelling could be felt in the epigastric region, extending from the ensiform cartilage to within an inch of the umbilicus, and passing beyond the edge of the rectus muscle on each side. As counter-irritation had no effect on the swelling, which increased in size, and fluctuation could be made out, it was aspirated a fortnight later, and 10 ounces (310 grammes) of dark-green fluid were removed. The fluid contained a large amount of albumen and red blood-corpuscles. She was discharged well in three weeks. The course of these two cases was clearly distinct from that seen in peritonitis due to rupture of some abdominal viscous. In the latter suppuration is soon present, and the whole course of the

illness, which usually terminates fatally in a few days, is acute. In the former, and also in Owen's case, the course was more chronic, the symptoms were those of progressive disease, and suppuration was not present. The rapid improvement following evacuation of the blood and serum supports Owen's view that this is due to the relief of tension. In the foregoing cases progressive anaemia was a marked symptom, and suggests that the effusion of blood continued for several days after the injury.

Bilton Pollard, of London,⁶ records a case of encysted or localized peritonitis in a girl of 6. The abscess-cavity extended on the right side over the liver to the under surface of the diaphragm, and on the left side as far as the spleen; laterally, it reached the flanks and iliac fossæ, and downward it extended into the pelvis. In front it was bounded by the anterior abdominal wall, and behind by the intestines, which were matted together with moderate firmness, with the exception of one coil, which passed across the pelvis to an attachment to the bladder. The cavity was well washed out, and large pieces of lymph were peeled off the walls. The child made an uninterrupted recovery. The cause of the peritonitis was not discovered. The author says that the extent of the abscess-cavity might suggest the name of general peritonitis, but he insists that there is a vast difference between this case and a real case of general peritonitis. In the latter the inflammation extends everywhere, between all the coils of the intestine; but in this case, although the pus reached everywhere else, the intestinal coils were not uniformly bathed with it, as they were almost all matted together and formed the posterior boundary of the abscess. He is inclined to believe that many so-called cases of general peritonitis which have recovered after washing out the peritoneal cavity have really been extensive, though localized, abscesses in that cavity.

Cysts of the Peritoneum.—Hydatid cysts of the omentum and pelvis have been studied by Monéger.¹⁰⁰ He has collected thirty-two cases. These growths he regards as ordinarily secondary, resulting from the rupture of visceral cysts of the same nature. They are always multiple, and when in the omentum cause crises of pain by traction on the stomach and transverse colon. The diagnosis is difficult; the prognosis is grave, from the risk of peritonitis. Exploratory cœliotomy is apt not only to reveal the nature of the

trouble, but to be curative. When numerous growths occupy the pelvis, vaginal hysterectomy is thought less dangerous than removal from above. Single cysts of the omentum should be incised, drawn out, and cut off, and the pedicle dropped back. Reference may be made to interesting clinical lectures on abdominal hydatids by J. Bland Sutton¹⁰⁷⁷, and Westhoff.⁶⁹

Gordon Macdonald⁵⁵⁷ records a case in which a man, aged 26, had some thirty hydatid cysts of various sizes scattered through the abdominal cavity, attached to the different organs. Laparotomy was performed, and some of the larger sacs were aspirated. As it was impossible, however, to remove or empty them all, the peritoneum was flushed with a weak carbolic solution and closed. Contrary to expectation, the man recovered, and was reported as quite well two years afterward.

Beckmann,²¹ reported to the St. Petersburg Medical Society a case in which very numerous hydatid cysts existed in the abdomen of a woman aged 28. Symptoms of ascites had been noted for five months, and were steadily increasing. After an indecisive exploratory puncture the belly was opened; many of the cysts were removed, but a great many had to be left in place. The wound was closed, after washing out the cavity with a salt solution. For the first day the patient did well, but on the second she had high fever, with dyspnœa, which proved fatal. Exploratory laparotomy is preferred by the author to puncture, on the ground of its greater safety, the certainty of diagnosis afforded by it, and the fact that often it is only the first step of a radical operation. From this view Tiling dissented, claiming that laparotomy should not be lightly resorted to, because of the danger of the anaesthesia necessary, the frequency with which cases so treated are found to be inoperable, and the diagnostic value of mere puncture.

J. Bland Sutton²², gives an account of a woman, aged 31, the mother of seven children, who, after her last confinement, noticed that her belly remained enlarged; some months later the swelling increased, and nodular masses were felt. An exploratory incision revealed these to be echinococcus cysts attached to the omentum and broad ligament; seven of the former were ligated and removed and the others shelled out, while one near the umbilicus, being calcified, was let alone. The pelvic peritoneum was studded with minute cysts, and on this account a drainage-tube was kept

in for some time; they were thought to be due to rupture of larger cysts containing echinococcus colonies, and their destruction would be favored by the irritation from the tube. When last seen, about three months after the operation, the woman was quite well.

Schüssler¹⁸,₁₉ reports very favorably upon Billroth's new method of dealing with intra-peritoneal echinococcus cysts, by incision, careful cleansing, and flushing with iodoform emulsion (1 to 10 of glycerin); after this the cyst is closed with a continuous suture and dropped back into the abdomen, when the wound in the abdominal wall is sewed up in the ordinary way. In five cases (four in which the liver was the seat of the parasite and one in which it was attached to the spleen) this plan was carried out with the best results. When the contents of a cyst are purulent, the iodoform does not insure asepsis; in such cases the method by incision in two stages may be employed, in conjunction with the one now described.

A case of cystic fibrosarcoma of the great omentum, in a man 48 years of age, is reported by Cazin.⁷,₁₂ The tumor was enormous in size. There was no history of traumatism. On two occasions punctures had been made and bloody liquid withdrawn, precluding the diagnosis of hydatids of the liver. The tumor was completely and successfully removed by Segond, in spite of some adhesions, especially to the large intestine at one point, where the cyst-wall was thickened and contained numerous small cysts. It was in this part that the tissue of the wall presented the microscopic characters of a small-celled sarcoma; and, although the removal had been thoroughly effected, the patient could not be thought secure against a recurrence of the disease.

McIntosh⁵,₁₄ reports a case of cysto-adenoma of the peritoneum in a man, removed with much difficulty on account of adhesions. During the operation the descending colon was torn half across, and there was alarming haemorrhage of uncertain source, checked by pressure with a sponge wrung out of very hot water. The torn bowel was stitched into the wound, and the artificial anus thus formed was closed by a second operation after fifty-six days, the patient being dismissed cured a month and a half later. In spite of rapid development, the growth was considered to be non-malignant, as there were no metastases. At the end of a year and a half there had been no return of the disease.

McPhedran, of Toronto,²⁹ has recorded the case of a man, aged 30 years, in whom a cyst of the peritoneum (described as *tuberculous*, but upon what grounds does not appear, except that the exposed portion presented many small nodules) simulated an hydatid cyst of the liver. It was exposed by a median incision, punctured, sutured to the external wound, and drained, with good result. J. M. Baldy, of Philadelphia,²⁸ describes a cyst diagnosed as parovarian; on operation, it was found densely adherent to the parietal peritoneum. All the pelvic organs were covered by the cyst-wall, as were the intestines also; papillomatous masses projected into it from both ovaries, and its whole interior was studded with tubercular or malignant nodules, from the size of a millet-seed to that of a pea. Drainage was made from the cyst-cavity, and from the peritoneum on either side. The woman recovered slowly but satisfactorily, a sinus remaining leading into the pelvis. Baldy thinks there had been a congenital abnormal distribution of the peritoneum, which had taken on a malignant (*tuberculous?*) change.

Nasse¹⁸,₁₉ reports the case of a child, 6 days old, who had symptoms of intestinal obstruction; on the left side of the belly there was felt a smooth tumor as large as an apple. On opening the abdomen this mass was found to be a cystic tumor, seemingly of the mesentery; the gut above ended in a blind pouch, and that below, much contracted, began in the same way. Both ends were brought into the wound and sutured; death ensued the next morning. The cyst was unilocular, lined with cylindrical epithelium, and contained red blood-corpuscles, cholesterin, and cell-detritus.

MESENTERY.

Cysts of the mesentery, according to Braquehaye,²,₁₈ may be divided into five classes: sanguineous, lymphatic or chylous (including serous), parasitic or hydatid, congenital or dermoid, and those derived from neighboring organs. They may be treated by extirpation when practicable; if otherwise, by incision and suture to the abdominal wall, with drainage or packing with iodoform gauze. W. D. Spanton²⁸ reports a successful operation for hydatid cyst of the mesentery in a woman aged 26 years. The cyst contained 3 pints ($1\frac{1}{2}$ litres) of clear fluid, and, as it could not be removed, its edges were stitched to the abdominal wound and a

drainage-tube inserted. Doyen, of Rheims, ⁵⁷⁷ describes a case of hydatid cyst of the mesentery successfully treated. Owen, of London, ²², reports the case of a woman, aged 20 years, who was suddenly seized with symptoms of obstruction, pain, vomiting, and constipation, with collapse. On opening the abdomen, nothing could be discovered but a tubercular inflammatory condition of all the mesenteric glands. Most of them were the size of horse-beans, and, though they were not particularly hard, none had undergone caseation. The abdomen was closed without washing, and the patient recovered without further pain or vomiting.

S. Smith, of Australia, ²⁸⁵, May 18, reports a case of chylous cysts of the mesentery in a child aged 8 years. Laparotomy was performed, the cysts evacuated and excised, and their stumps turned in and sutured by Lembert's method. The child made an uninterrupted recovery from the operation, but, as the condition was brought on from a blocking up of the lymph-channels from tubercular nodules, she died from a disseminated tubercular condition.

Heurteaux, of Nantes, ¹⁵⁴, July 1, reports a case of myxolipoma of the mesentery in a farmer aged 60 years. It was of very rapid growth (6 months), and when removed by a median section weighed over 14 pounds (7 kilogrammes). Recovery followed.

ILEO-CÆCAL REGION.

Reference may be made to a paper by Lydston, of Chicago, ¹⁹, Nov. 12, 1888, on inflammations about the caput coli.

In a case reported by Briddon, of New York, ¹, Dec. 24, 1888, a pin was found imbedded in a mass of granulation tissue behind the cæcum, in a man aged 47; it had given rise to great irritation and very obscure symptoms, all of which subsided upon its removal.

Roper, of London, ², Dec. 1, 1888, reports the successful removal of a cancerous growth of the lower end of the ileum, in a woman aged 54 years. At the first operation the bowel was opened above the obstruction, and a few days later the growth was excised and the gut united by sutures. A faecal fistula, however, formed, which the patient refused to have closed.

Rudolf Frank, of Vienna, ⁸, Nov. 17, 1888, reports a case of adeno-carcinoma of the cæcum, in a man aged 36 years, in which the tumor was successfully removed and the small and large intestines joined by a circular row of sutures.

Southam, of Manchester,⁶ reports a case of faecal fistula following an abscess in the neighborhood of the cæcum, in a male aged 19, on whom he performed lateral anastomosis with Senn's decalcified-bone plates. No attempt was made to close the perforation in the bowel, which was situated at the junction of the ileum and cæcum. The patient was up at the end of the third week, and the fistula rapidly healed.

Hastings Gilford, of Reading, Eng.,⁶ reports an interesting case of sarcoma of the cæcum and vermiform appendix. The patient was a married woman, aged 27, who had suffered for thirteen years with occasional attacks of coldness, pallor, and numbness of the right lower extremity. Since childhood she had been subject to constipation and also to occasional biliary attacks. She had on two occasions been compelled to give up a situation as domestic on account of the pain, and had frequently been obliged to walk with the aid of a stick, because of the weakness of her thigh and leg. The pain became more severe, and changed to the region of the umbilicus, extending from thence to the loin, and down to the groin and thigh on the right side. It was increased by sudden jarring of the body. There was no nausea, and the bowels were fairly regular. Abdominal palpation revealed a tumor in the region of the right kidney; that organ appeared to be uniformly enlarged, but to be situated on a lower level than usual, and its surface was distinctly nodular. As some urinary disturbances were present, a diagnosis of sarcoma of the kidney was made. The abdomen was opened by a lumbar incision. The growth was found to spring from the lower fourth of the kidney, and partially to ensheathe it. The incision was extended down to the crest of the ilium, and then along it for a distance of three inches. It was then ascertained that the growth was attached to the iliac fascia below, the psoas behind, and the cæcum and ileum within. It was peeled off from the kidney, together with a piece of capsule; the adhesions to the iliac fascia were torn or cut through, and the tumor separated from the psoas, a piece of the muscle being removed with it. The mass was brought outside the abdomen and cut off, four and a half inches of the cæcum and ascending colon and three and a half inches of the ileum being resected. Half of the diameter of the colon was cut obliquely, and closed with a continuous, medium-sized, chromic catgut suture.

running through all the coats. The small intestine was then joined to the remaining half of the colon with the same continuous catgut suture, which also united the cut ends of the mesentery. The parts were washed with boiled water, a large, bulbous, glass drainage-tube inserted, and the wound closed with silk stitches. The operation lasted two hours, and the patient was very much collapsed when put to bed. The recovery, however, was a quick one. The temperature did not rise above 99.5° F. (37.5° C.), except on the fourth day, when it reached 100.8° F. (38.2° C.). The wound had entirely healed by the eighteenth day. On cutting into the growth three or four small collections of pus were laid open, and in one of these a dark-brown, friable concretion was found, almost twice the size of a cherry-stone. A probe passed from this cavity down the vermiform appendix into the cæcum. The growth forming the walls of these abscess-cavities was sarcomatous in character, and was intimately adherent to the walls of the colon and ileum, but it did not protrude into or otherwise narrow the lumen of the bowel.

APPENDIX VERMIFORMIS.

Reference may be made to an interesting paper by Bryant, of New York,³⁶ on the relations of the gross anatomy of the appendix to some features of the clinical history of appendicitis; it is well worth study, but does not admit of analysis. A curious anomaly is recorded by Boido¹⁴⁷; the appendix, arising from the fundus of the cæcum, ran up over the brim of the pelvis to open into the ileum about three and one-half inches from the ileo-cæcal valve, by an orifice large enough to admit a good-sized probe.

Appendicitis.—The literature of this subject is bewildering from its volume; and as nearly all the articles written contain histories of cases, it is evident that the experience of the profession is already very large. The question most warmly debated in regard to it is as to the propriety of surgical interference; or, perhaps, rather the indications for it. R. T. Morris, of New York,⁵⁹,_{Jan. 14, 1881} is the most positive and outspoken advocate of operation under all circumstances, "as soon as the diagnosis of appendicitis is made." Cordier, of Kansas City,¹⁹, also urges early surgical treatment, giving three instances of fatal results from delay. Rosenstirn⁷⁷,_{Nov. 1882}; W. E. Ashton, of Philadelphia⁸⁰; Richardson, of Boston⁹⁹,_{Dec. 8, 1882};

Poncet and Jaboulay ⁹¹_{Nov. 10, '92}; Haslam ²_{Dec. 24, '92}; Crowell, of Kansas City ¹⁰²_{Dec. '92}; Lydston, of Chicago ¹¹⁵_{Jan.}; Hoffman, of Philadelphia ¹⁹_{Feb. 4}; ⁶¹_{Aug. 6}; W. T. Bull, of New York ⁵⁹_{Mar. 18}; Allen, of Cleveland ²²²_{Mar.}; Lennander, of Upsala ³³⁶_{Apr. 22}; English, of Winona, Minn. ¹⁰⁵_{July 18}; Murphy, of Chicago ¹⁰⁵_{Aug. 18}; J. B. Deaver, of Philadelphia ¹¹²_{Sept.}; and Fairchild, of Clinton, Ia., ¹⁰⁶_{Sept.} have all expressed themselves on the same side.

Against operation we find Jonas, of Omaha, Neb. ¹⁰⁶_{Nov. '92}; Lange, of Pittsburgh ¹⁶¹_{Apr.}; an anonymous English writer ²²_{Apr. 5}; the late Dr. Ross, of Toronto ²⁵⁷_{July}; and Nélaton, Lucas-Championnière, Verneuil, and Routier. ¹⁴_{June 25}. Runge, of St. Louis, ⁵⁹_{Apr. 16, July 8}, strongly opposes early operation.

More neutral ground is taken by others. Sendler ⁸⁴_{Dec. 18, '92} is of opinion that the indications for operative treatment have been too much enlarged by many surgeons, especially in America. He would limit such procedures to cases of extra- or intra- peritoneal abscess or retroperitoneal phlegmon; fibrino-purulent peritonitis about the appendix; acute perforation; or severe recurrent attacks. Gordon, of Portland, Me., ⁹⁰_{June 18} advocates the use of salines in heroic doses in cases of peritonitis arising from trouble in the cæcum or appendix, and in the acute stage of appendicitis, at which time he thinks operation involves risk. Should abscess occur, he advises opening and draining, with the least possible disturbance of tissue; he holds that removal of the appendix does not set aside the disease, but may be done with advantage and safety when convalescence is established. He cites six successful cases so treated.

Von Bergmann ²¹_{Oct. 22, '92} thinks the term "perityphlitis" should be abolished, believing that the cases so diagnosed are in fact cases either of typhlitis, of acute impaction, or of chronic appendicitis without perforation. Operation, he thinks, is demanded at once in abscess; and if this is intra-peritoneal, its usually multiple character must be kept in mind. The removal of the appendix should only be done in the interval.

Barton, of Philadelphia, ⁶¹_{July 1}, argues against the idea that in cases of abscess the appendix should invariably be sought for and removed. Treves, of London, ⁹_{Nov. 6, '92} says that he operated in 1887, and "was able to correct the distortion of the appendix without excising it"; in 1888 he formulated the proposal for deliberate removal of the appendix during a quiescent period, but it was not well received. "In due course, however," says he, "an

exuberant reaction took place, and of late years appendices have been removed with a needless and illogical recklessness which has brought this little branch of surgery into well-merited disrepute."

Mercier, of Montreal,¹²² advises operation only when, by reason of recurrences and the existence of a tumor, rupture is feared, or when perforation has taken place and given rise to peritonitis. Duret and Monestié, of Lille,²²⁰ and Halbert, of Waco, Tex.,⁸⁵ take much the same ground. Similar views have been expressed¹⁴ by Quenu, Bouilly, Reynier, and Monod.

Bulkley, of New York,²⁸² records his own case: when 12 years of age he had symptoms of appendicitis, which disappeared with a very large discharge of pus through the urinary bladder. In a case reported by McCallum, of London, Can.,⁹ a boy, 9 years old, was about to be operated upon, when he passed "a pint or more" of foul-smelling pus by the rectum, with relief. In another, related by Straight, of Louisville, Neb.,¹⁰⁸ a girl, aged 8, who had had symptoms of appendicitis (and peritonitis?) for seven weeks, felt something give way, and her pain ceased; next day she passed at stool "about a pint of ill-smelling pus," and from that time she improved, but two months later the discharge of pus per rectum still continued. The tumor in the iliac region remained perceptible, but was not sensitive.

A singular case has been reported by McCallum, of London, Can.,⁹ in which a lady, aged 30, died with symptoms of intestinal obstruction on the fourth day after hysterectomy. At the autopsy fibroid strictures of the ileum and descending colon and a twist of the former were found. The appendix "was found passing upward in front of the ascending colon, over the anterior margin of the liver, one inch to the right of the gall-bladder, where it disappeared in a mass of old inflammatory tissue." Adhesions between the liver and diaphragm having been broken up, the appendix was traced "over the upper hepatic surface to within two and a half inches of its posterior border." Apart from the curious relations of this appendix, it would seem to have been of most extraordinary length. There was a history of pneumonia and peritonitis sixteen years previously, with a discharge of pus through the eighth intercostal space, and expectoration of the same.

Reports of successful operations have been published by Macquillan, of Cleveland, Tenn.¹⁰¹; Briddon, of New York

(five cases)⁹⁶; Pearse, of Kansas City (three cases)⁷⁸⁶ Mar.; Parker, of Cleveland, O. (three cases)²²² Apr.; Sullivan, of Brooklyn (five cases)¹ Apr. 15; Plummer, of Salt Lake City⁵⁹ Apr. 28; McClintock, of Topeka¹⁰⁶ May; W. B. Rogers, of Nashville⁷⁴ May; Goodman, of Louisville²²⁴ June 17; Lyle, of Franklin, N. C.¹²⁰ July; Little and Moore, of Minneapolis¹⁰⁵ July 14; Cabot, of Boston (five cases)⁹⁹ July 29; Keef, of Oconto, Wis.¹⁹ July 29; Southard, of Fort Smith, Ark.⁵⁰⁶ July 18; Laidley, of St. Louis (seven cases)⁶¹ Aug. 5; Wyman, of Detroit⁷¹ Sept.; Schenk, of Kennedy, Tex.¹⁴⁸ Sept.; Evans, of Traverse City, Mich.²³ Sept.; Long, of Randleman, N. C. (four cases)⁴³ Sept.; Kümmer, of Geneva¹⁹⁷ Jan. 20; and Weiss, of Nancy.¹⁸⁴ Nov. 1, 1882.

Cases of unsuccessful operation have been reported by C. N. Smith, of Toledo¹⁰⁰³ Dec. 28; Chambers, of East Orange, N. J.⁹ Jan.; Kuyk, of Richmond, Va.⁸¹ Mar.; Parker, of Richmond, Va.⁸¹ Apr.; Knight, of Richmond, Va.⁴⁰ Apr.; Carter, of Lake Park, Ga.¹¹⁷ July; Cartledge, of Louisville¹⁰¹ Aug.; Wright, of Brooklyn¹⁵⁷ Aug.; Laidley, of St. Louis, Mo.⁶¹ Aug. 5; Long, of Randleman, N. C.⁴³ Sept.; Kelynack, of Manchester, Eng.⁹⁰ Jan.; Williams, of London⁹⁰ Feb.; Southam² Aug. 12; Cabannes and Bousquet, of Bordeaux¹⁸⁸ Feb. 12; Sonnenburg, of Berlin⁶⁹ Feb. 22; and Danseux.⁸¹ July 12.

A number of reports have been made presenting cases, some of success and some of failure. H. P. Wright, of Ottawa, Can., reports 3 successes and 3 failures; Wyman, of Detroit,¹ Feb. 25 2 successes and 2 failures; Jacobson, of Syracuse, N. Y.,⁹ Mar. 4 successes and 2 failures; Richardson, of Boston,⁹⁹ Mar. 23 4 successes and 3 failures; Vance, of Louisville,²²⁴ Mar. 26 4 successes and 1 failure; Lauenstein, of Hamburg,⁶⁹ May 11 5 cases of appendicitis alone, with 2 successes and 2 deaths; 7 of general peritonitis from rupture of the appendix, with 2 recoveries and 5 deaths; Barker, of London,² May 13 11 successes and 2 failures; Gage, of Worcester, Mass.,⁹⁹ May 18 10 cases,—2 not operated upon, both of which died; 8 operations, with 7 successes and 1 death; Schaefer, of Chicago,¹⁰⁸⁰ June 2 successes, 2 deaths; Carmichael, of Montreal,²⁸² July 2 successes and 1 failure; J. H. B. Wright, of San Jose, Cal.,⁷⁷ Sept. 1 success and 2 failures; Huntingdon, of San Francisco,¹⁴⁷ Sept. 4 successes and 2 failures.

Broughton, of Boston,⁹⁹ Mar. 22 records 5 cases, all successful, 2 of them operated upon (in one the appendix could not be found), while in the other 3 the symptoms subsided under medical treatment. Lydston, of Chicago,⁹ May has reported 7 cases treated

without operation, of which 6 recovered and 1 died, and 4, all successful, in which surgical interference was limited to the opening of abscesses in the iliac region. Lauenstein, of Hamburg,⁶⁰ has reported 12 cases of circumscribed inflammation, treated expectantly, with 1 death; also 9 similar cases, all operated upon with success. Monestié, of Lille,²²⁰ reports a case of suppurative appendicitis treated by mere incision, in a boy aged 15, who made a rapid recovery.

A number of instances have been recorded in which no operation was performed. Luzzatto, of Palermo,⁵⁸⁹ gives one, and Plá, of Havana,¹¹¹⁴ another, in both of which the expectant treatment was successful; but Hunt,¹⁹ and M. Price,²³ both of Philadelphia, report deaths under that method. McDonald, of Jackson, Tenn.,⁷⁴ has published 5 cases, all ending favorably, in 4 of which there was no operation, while in the fifth the abscess was opened, but no attempt was made to find the appendix.

Margery²¹² has described a disorder called by Poncet "acute infectious appendicitis," distinguished by its rapid involvement of the peritoneum, without ulceration, perforation, or gangrene. It results from occlusion of the orifice of the appendix by inflammation, and absorption of its contents; the presence of the bacillus coli communis is thought also to have an important influence. Clinically, it does not differ from other forms of the disease except in its rapid course. Immediate operation—lateral laparotomy, excision of the appendix, and drainage of the peritoneum (for which the ischio-sacral route may be employed)—is urged.

Tuberculous appendicitis has been discussed by Reclus,¹⁴ by Richelot,¹⁴ and by Cathcart.⁸⁶ Neale, of Upper Lehigh, Pa.,⁵⁹ calls attention to the frequency of post-partum appendicitis.

INJURIES OF THE ABDOMEN.

Sieur³⁶⁰ is a zealous advocate of operative interference in cases of severe abdominal contusion in which there are good grounds for suspecting visceral injury. In such cases he would recognize only two contra-indications forbidding prompt surgical treatment: intense nervous shock immediately following the injury, and at a later stage, when the patient, suffering from extensive and advanced peritonitis, is cold and cyanosed, and in a state of extreme collapse.

Francis H. Markoe, of New York,¹ reports ten cases of penetrating abdominal wounds, three of which were without visceral complications. He sums up the treatment as follows: 1. Given a wound of the abdominal wall, proof of penetration should always be sought for, in the absence of definite symptoms, by following the wound carefully down to the peritoneum. 2. Evidence of penetration having been obtained, median laparotomy should be immediately performed, or the wound enlarged to allow of a sufficient inspection of the abdominal contents, of the repair of any injury found, or of adequate cleansing of the cavity. 3. Thorough irrigation and temporary drainage should be employed whenever much soiling of the peritoneum has occurred or is likely to follow, or when there are evidences of beginning inflammation. A list of fifty-four cases not included in Morton's tables is appended, with a mortality of nearly 15 per cent.

Gilbert Barling, of Birmingham,² reports a case of intra- and sub-peritoneal haemorrhage in a lad of 20 years, following an injury at foot-ball. Laparotomy was performed, and about 10 ounces (280 grammes) of blood removed from the peritoneum. The lad made a good recovery.

Owen, of London,³ reports a case of traumatic non-suppurating peritonitis in a man of 23 years, the result of a fall from a bicycle. Laparotomy was performed, and 5 pints ($2\frac{1}{2}$ litres) of bloody serum removed. The recovery was rapid.

In a case recorded by Boiffin,¹⁰⁰ a man, aged 33 years, received the kick of a horse on his abdomen; next day he had thirst, agitation, quick respiration, a pulse of 120, a slightly-pinched face, and his temperature fell to 96.8° F. (36° C.). Cæliotomy was proposed, but declined. All the symptoms were aggravated until the tenth day, when death ensued. In connection with this case, three others were reported by Michaux, in support of the idea that in all but slight injuries of this kind the abdomen should be explored. One received a blow on the abdomen from a barrel. He refused an operation, and died with symptoms of perforation. The second received a severe shock, and when the abdomen was opened a perforation was found in the angle of the colon. This was sutured, and the patient made an excellent recovery. The third was that of a man who fell from a third story. Laparotomy was performed, and a large effusion of blood was

discovered in the peritoneum. This was removed, and the patient also recovered. It is pointed out that while in slight cases no one would interfere, in grave cases the course to be pursued is plain; it is in the intervening grade of cases that it is difficult to decide.

Hulke, of London, ^{Dec. 31, 1866}, reports a case of multiple visceral injuries in a man aged 37 years, the result of an elevator crush, in which there were but trivial marks of violence on the surface of the body. The autopsy showed the liver, spleen, and right kidney to be lacerated.

N. C. Mitra, of Bengal, ^{Jan. 2, 1867}, reports a case of rupture of the abdominal wall in a Hindu, aged 40 years, suffering from ascites, the result of a fall. The rupture extended three inches downward from the ensiform cartilage. The intestines protruded, and one of the loops was transversely ruptured. An artificial anus was formed, the gut being stitched in the wound, but the patient did not recover from shock, and died in a few hours.

Moran, of Detroit, ¹⁸⁶⁷, reports a singular case of abdominal abscess in a girl 8 years old. It was situated outside of the peritoneum, and seemed to have originated in a slight blow on the left lumbar region several weeks before it was recognized. The quantity of pus evacuated was estimated at 4 quarts—litres (!). Drainage was made, and the child recovered rapidly. Another case, reported by Hersche, ¹⁸⁶², in a woman aged 32 years, would seem, perhaps, to have been one of blood-cyst. The disease was of five years' duration; the tumor, nearly as large as a man's head, was exposed and tapped, and two litres (quarts) of chocolate-colored liquid drawn off. Suture of the cyst-wall to the peritoneum and tamponing with iodoform gauze completed the operation, which was successful.

Conner, of Cincinnati, ^{Sept. 1861}, has discussed the question of cœliotomy in gunshot wounds of the abdomen. He cites the statistics collected by various writers, showing the mortality to range from 65.6 per cent. to 70.67 per cent., and assigns shock as one of the chief causes of these results. The necessity for operation, in his opinion, is to be determined by the evidence of hæmorrhage or faecal extravasation, and in some degree by the probability of visceral injury, as shown by the size and apparent course of the missile. Peritonitis does not contra-indicate interference, although it must increase the gravity of the prognosis.

Newton, of Montclair, N. J., ⁵⁹ _{Apr. 22} reports a case in which a No. 44 bullet passed through the lower part of the abdomen of a girl, aged 24, and dropped out from the vagina. In its course it made a superficial wound of the sigmoid flexure, which was sewed up, the abdomen having been opened. The only drawbacks to the girl's recovery were constipation and an attack of cystitis.

Marsh, of London, ⁶ _{Feb. 25} reports a very interesting case of an acute localized inflammation of the ascending colon, apparently following an injury. The boy, aged 14, strained himself in trying to lift a heavy weight. Half an hour afterward he was seized with vomiting, and pain in the right iliac fossa. These symptoms increased in severity, with tympanites, constipation, and a firm, tender, sausage-shaped mass opposite the crest of the ilium. It was thought to be a case of appendicitis, and the abdomen was opened over the tumor. The appendix and cæcum were found perfectly healthy, but the ascending colon for a distance of three inches was enlarged, of a dark-red or livid color, succulent, and firm, evidently from an acute inflammatory hyperæmia and exudation. The parts were washed with a 1-to-4000 solution of bichloride of mercury and the abdomen closed. The temperature fell gradually from 102.4° F. (39.1° C.), the swelling slowly disappeared, and recovery took place gradually.

Chaput ⁹³ _{Jan.} discusses the treatment of wounds of the intestines. He condemns the expectant plan, and says the unfavorable results hitherto obtained by laparotomy are due either to the lateness of the intervention, to overlooked lesions, or to faults of technique.

He objects to Senn's hydrogen-test, thinking exploratory section safer and more effective. He cleanses the peritoneum with dry, sterilized sponges. In case of excessive haemorrhage he follows Senn's method, making digital compression of the aorta until the bleeding points are secured. For wounds involving more than one-fourth of the circumference of the bowel he employs a procedure of his own, bringing up a loop of healthy intestine, and securing it in the gap by a double row of sutures.

OPERATIONS ON THE ABDOMEN.

Reference may be made to an interesting lecture by Mitchell Banks, of Liverpool, ¹⁵ _{Feb., Mar.} on "Laparotomy in General Surgery"; also to a paper by Senn, of Chicago, ⁶¹ _{Aug. 12} on "Enterorrhaphy, its

History, Technique, and Present Status"; and to one by Manton, of Detroit,²³⁴ on the "After-Treatment of Cœliotomy Cases."

Richardson, of Boston,²³⁵ discusses the acute abdominal symptoms demanding immediate interference. He limits himself to cases in which persons previously healthy are suddenly attacked, and without warning or apparent cause. The pathological conditions thus met with are, in the order of frequency, septic extravasations (in the vast majority of cases from perforation of the vermiform appendix), hæmorrhage, and acute obstructions. Pain, vomiting, and shock are the main phenomena generally presented, and should, Richardson thinks, be regarded as rendering exploration imperative. He argues that the risk of such procedures in the hands of experts is but slight, and that the number of needless explorations will be extremely small.

Howitz, of Copenhagen,²³⁶ advocates, in order to obtain a strong cicatrix after cœliotomy, that the incision should be made about two centimetres from the median line, through the substance of the rectus muscle; that the twisted or hare-lip suture be used, including only a small amount of peritoneum, and that the material employed should be silk-worm gut.

Cathcart²³⁷ advocates the use of rectal injections of small quantities of water to allay thirst after abdominal operations.

Some mistakes in the technique of abdominal surgery are discussed by J. Rutherford Morison.²³⁸ This author argues that the general principles of surgery are to be followed in this region as elsewhere. He thinks the three most common mistakes are: (1) septic contamination; (2) imperfect arrest of hæmorrhage; (3) neglect of shock. Of the first, he says it is invariably due either to faulty technique in the operation or to faulty after-treatment; a surgeon who can secure ordinary wound-healing without suppuration need have no fear of the peritoneum. As to hæmorrhage, he urges ligation of every bleeding-point, or the temporary application of clip-forceps, or packing with gauze. He recommends drainage wherever bleeding may perhaps occur; and has twice seen the injection of a solution of perchloride of iron through the tube—a method introduced by Tait—effectual in arresting the flow. Against shock he considers warmth the best antidote, and gives excellent directions for its thorough application, both before, during, and after the operation. He thinks any procedure not strictly ex-

ploratory ought to be completed if it offer "a scientific chance" of life. The incision should be long enough to give free access to the hand; it is better that it should not be exactly in the median line. Without thorough anæsthesia there is apt to be troublesome rigidity of the abdominal wall. Stripping up of the peritoneum, if thickened, is a mistake readily made, and a dangerous one. The separate suturing of the peritoneum, the muscular layer, and the skin is advised. (My own experience is very strongly in favor of a careful closure of the peritoneum by a special continuous suture, generally of catgut.) Morison condemns any prolonged search for the cause of localized suppuration within the abdomen as likely to be not only futile, but injurious; he thinks it can, if necessary, be made later. When it presents itself readily, such cause should, of course, be removed.

Haskin⁷⁷ advocates the introduction of a large soft-rubber tube through the anus high up into the colon, before the closure of the wound after abdominal section, with the view of preventing distension of the bowel by fæces or gas during the first few days.

W. Briggs, of St. Louis,³⁸⁴ ~~Mar. 15~~ thinks that there is great danger of peritonitis from the immediate restoration of intestines to the abdominal cavity, by reason of insecurity of sutures, sloughing, etc. He therefore proposes to cover the parts operated on with a sheet of animal membrane, and to keep them outside of the body for six, eight, or more hours, until the surgeon can satisfy himself that they are in good condition to be returned. Experiments on animals have convinced him that this can be done not only safely, but with great advantage. It seems scarcely likely that the plan will be generally adopted, although there are instances in which intestine of doubtful integrity might well be thus kept under supervision.

McGraw, of Detroit,⁹⁶ ~~Sept.~~ proposes, in order to prevent subsequent contraction of the orifices in cases of intestinal anastomosis, simply to secure the continuity of the mucous membranes at the time of operation. This he would do by evertting flaps of the edges, so as to bring the serous surfaces in apposition, and fastening them by Lembert sutures; after which, the two portions of intestine being joined, it will be seen that the connecting orifices are lined by mucous membrane. The procedure differs slightly in detail in different portions of the intestinal tract.

As to the safest point for tapping in abdominal dropsy, Butz,⁶⁹⁶ from researches in the dead subject, says that in ascites, which affords almost the sole indication for the procedure, the diastasis of the recti muscles is such as to make wounding of the epigastric artery very probable if the usual point (Monro's) is selected. Under such circumstances the puncture is best made in the linea alba, below the navel. Even then, however, as in a fatal case of Trzelicki's, an anomalous branch may be cut; so that the operator should always be prepared for ligation when about to perform paracentesis.

Delagénière¹⁴, advocates the use of Trendelenburg's position, the body of the patient being inclined at an angle of forty-five degrees, with the head downward, in all abdominal operations.

For the prevention of prolapse of the bowel after inguinal colotomy, Barker,² thinks the main point is to make the opening in the abdominal wall as small as possible. He therefore tears through the muscular layers, draws the bowel out until its mesenteric border is well through the wound, and secures it by from six to twelve silk sutures; the opening in the skin is then sewed up so as to embrace it closely. After a few days the loop of gut is cut away flush with the skin. For the same purpose, it is proposed by Mansell-Moullin,², to proceed as usual until the loop of intestine has been drawn out, then to lift up the aponeurosis from the internal oblique at the inner side of the wound for about an inch, and to make a second incision that much nearer the median line, in the direction of its fibres; under the isolated strip thus raised the loop of gut is slipped and brought out at the second incision, when that first made is closed by suture. Abdominal section for diagnostic purposes is defended by Cushing, of San Francisco,⁵⁹, with four histories of cases illustrating its propriety.

In a case reported by Bell, of Montreal,²⁸² symptoms of perforation with peritonitis occurred in a girl of 18 years, at the fourteenth day of typhoid fever; the abdomen was opened, and the rupture found in the ileum about ten inches from its lower end. This was sutured, but death ensued twenty hours later.

Mygind, of Copenhagen, corresponding editor, communicates⁶⁷³ a case reported by Zahlmann in which Hansen, of Aarhus, Denmark, removed six inches of the ileum, the entire cæcum, and four inches of the ascending colon, for tuberculous disease in a girl

aged 17 years. The ileum was divided obliquely, and united by Lembert sutures to the cut end of the colon. Six months afterward the patient is stated to have remained well.

In a case supposed to be one of cancer of the hepatic flexure of the colon, with obstruction, in a woman aged 53 years, reported by Keen, of Philadelphia,⁷⁶⁰ temporary relief was given by the formation of an artificial anus. Fifty-four days later an ileo-colostomy was performed, Murphy's "anastomosis-button" being used; the artificial anus was excised. The patient did well, passing the button per anum on the twelfth day. On the forty-seventh day, however, an ulcer in the ascending colon gave way, and death from peritonitis ensued. At the autopsy the anastomotic orifice was found to have contracted one-half; and Keen considers this a very serious objection to the button, which as a merely mechanical device he regards as admirable. Another possible difficulty might be found in its size, preventing it from being readily passed through the bowel.

Jahreiss³⁴, records an instance in which, a few weeks after the removal of the uterine adnexa in a woman aged 24 years, a second operation was performed on account of intense distress produced by adhesions of the omentum to the abdominal wall. These being thoroughly separated, the symptoms disappeared.

Matignon¹⁸⁸ proposes, in making a gastro-intestinal anastomosis, the use of plates made from the hoofs of cattle. Each plate is perforated, around the central opening, at four points; the holes in one, for the intestine, are just large enough to carry a single thickness of gut, while those in the other will take two. The four holes in one plate correspond exactly with those in the other. For use, the plate for the intestine is armed with four threads of catgut, passed through the holes and each knotted at one end; the intestine being incised, the plate is passed in, and by means of a Reverdin needle the threads are drawn out through the wall and the free ends confided to an assistant. An incision is next made in the stomach-wall. The other plate is passed into the cavity of the viscus, and then by means of a Reverdin needle a long catgut thread, previously arranged in the form of loops through the holes in the plate, is brought out in its successive loops through the wall; one hole will carry, not a loop, but the two free ends. Now the catgut threads from the intestinal plate are passed through the

corresponding loops, and by drawing upon all the loose ends the two plates are brought close to one another, the visceral walls being between them, and this contact is insured by firmly tying the free ends of the catgut. The operation is finished by the application of Lembert sutures, which is rendered very easy by the presence of the plates, as the intestinal wall is stayed up by them so as to be under perfect control. It is claimed that this procedure is much simpler in practice than would seem from the description, and that it can be effected in a very brief time. A question was raised by Villar¹⁸⁸ as to the absorbability of the plates.

In circular (end-to-end) enterorrhaphy, Robinson, of Chicago,⁵⁹ opposes the use of the continuous suture all around the gut, as the thread always falls into the canal, and acts as a path for infective germs into the peritoneal cavity. He thinks the results are far better from the use of the Czerny suture, in what is known as the "base-ball" form, or from the Lembert, made continuous for three to five stitches, and then interrupted and tied.

Robson, of Leeds,² describes a method of making intestinal anastomosis by means of decalcified-bone bobbins. The loops to be joined are brought outside through an incision in the abdominal wall, and the peritoneal cavity is shut off with aseptic gauze; with a silk suture eighteen inches long the loops are now sewn together by peritoneum and outer muscular coat only, from right to left, each stitch being about one-third inch long. An opening, just large enough to admit the bone tube, is now made in each loop, about one-half inch from the line of suture; and the two further margins are sewed together either with chromicized gut or with silk dyed with aniline, the suture running from right to left. In each case both ends of the suture-thread are left long. Now the tube is introduced, one end into the opening in each loop; the marginal suture is completed from left to right, and the two ends tied; then the outer serous suture is likewise completed half an inch from the marginal one, its two ends drawn upon, tied, and cut off short. Two cases are adduced in proof of the practical advantage of this method.

Another plan is proposed by J. B. Murphy, of Chicago.⁵⁹ This surgeon has devised what he calls an "anastomosis button," consisting of two small, bowl-shaped bodies (of what material is not stated), each having a hollow stem, one of which has on its

interior a female screw ; the other stem slips easily into this, and is maintained at any desired point by the pressure of two brass springs, soldered within it and projecting through openings near the end of the stem, so as to catch in the screw-thread just mentioned. Each bowl has four openings around it, for drainage. A small, thin-edged brass ring is placed in the "male bowl" and held up by a wire spring, so as to project one-eighth inch above the edge of the bowl. Thus, "we have two hemispherical bodies held together by invaginating cylinders." These hemispheres of the button are inserted in slits or ends of the viscera to be operated on. A running thread is placed around the slit in the viscus, so that when it is tied it will draw the cut edges within the clasp of the bowl. A similar running thread is applied to the slit in the viscus in which the other half of the button is inserted, and the bowls are then pressed together. The pressure-atrophy at the edge of the bowl is produced by the brass ring supported by the wire spring. The author claims for this device (1) that it retains its position automatically ; (2) it is entirely independent of sutures ; (3) it produces a pressure-atrophy and adhesion of surfaces at the line of atrophy ; (4) it insures a perfect apposition of surfaces without the danger of displacement ; (5) it is applicable to either lateral or end-to-end approximation ; (6) it produces a linear cicatrix ; (7) its technique is extremely simple. Three cases in the human living subject and a number of experiments on dogs are adduced in support of these statements.

Connell, of Milwaukee,⁶¹ describes a method of suture for intestinal anastomosis in which no plates are used and but two knots are made. The cut ends of the bowel having been invaginated and closed, openings of the required length are made at the convex border of each portion ; a suspending loop is passed at either end, so as to oppose the openings, and the suture is made at one side. Slacking the loops and passing the knots of the suspending sutures down through the middle, the latter may be drawn up and will bring the other edges of the opening into apposition, when they can be in like manner sewn together, but closely and without loops. The suspending threads are now withdrawn, the opposite ends of the two edge-sutures are drawn upon until the edges are brought close to one another, and then the two knots are made, one at each end of the opening.

Roman von Baracz, of Lemberg, ⁴¹_{May 28}, strongly advocates Senn's method of making intestinal anastomosis by means of decalcified-bone plates. He says the mortality where it has been used is 24.5 per cent. as against 42 to 47 per cent. by the older plans; that it is simpler, more quickly executed, and affords greater security against leakage of the intestinal contents. Dawbarn, of New York, ²²_{Feb. 7, 1872}, says that von Baracz has appropriated his (D.'s) idea of employing raw-vegetable plates for this purpose, and that the claim has been unjustly allowed by other writers. It would seem that the matter was worked out independently by the two surgeons.

Treves is reported ²²_{Dec. 7, 1872} to have successfully removed a portion seven inches long from the sigmoid flexure, in a middle-aged woman, for cylindroma; the V-shaped opening in the mesocolon was closed, and the two portions of the gut secured together by Lambert sutures. The upper part being much larger than the lower, the edge of the latter was first joined to a corresponding portion of the former, the remainder of which was then firmly closed by the same kind of sutures. Treves does not use bone plates, thinking that they do not answer so well in the human subject as in the lower animals, and especially in the carnivora. A week later the patient was doing well, and had had seventeen natural movements of the bowels. Allingham ²_{Mar. 18} gives a similar case, in which both ends of the gut were brought into the wound and the diseased portion excised after ten days.

SPLEEN.

Cysts.—Several instances of cysts of the spleen are placed upon record. Cacciopoli ⁵⁸⁹_{Apr. 16} has reported one, in a man aged 49, where the communicated pulsation of the aorta made the diagnosis obscure; the abdomen was opened, the cyst punctured, and recovery ensued. Terrier ¹⁴_{Nov. 6, 1872} reports that in a woman, 33 years old, under his care, he opened the abdomen, evacuated a sero-sanguineous cyst, resected its wall, cauterized the cavity with a red-hot iron, fixed its edges to those of the abdominal wound, and tamponed. The patient recovered, but still had some pain in the affected region. (The discussion on this case at the Société de Chirurgie was of interest.) Another instance of hydatid cyst, in a woman aged 50, has been reported by Mondret. ¹⁴_{Oct. 10, 1872} The tumor was cut down upon, the cyst emptied and drained, and a

slow recovery ensued. Courtin¹⁸⁸, June 18, met with a case of hydatid cyst, in a boy aged 12, in which the emptying of the contents once by aspiration effected a cure.

Wounds.—Riegner⁴, April 20, gives an account of a boy, aged 14, who by a fall sustained a complete separation of the lower portion of the organ. This, as well as the upper part, was removed by laparotomy; healing was complete by the twelfth day, but four weeks later the leg became gangrenous by reason of a venous thrombus, and amputation by Gritti's method was performed with success. Battle²², April 19, reports a fatal case of rupture of the spleen by a fall, in a man aged 40; laparotomy was done and the splenic vessels tied, but the removal of the organ was impossible on account of extensive and close adhesions. In both these cases intra-venous injections of saline solutions were effectual in bringing the patients into condition for operation. It may be interesting to note that in Riegner's case, seven months after the removal of the spleen, although the boy was in good health, all the external lymphatics were swollen; this had been observed during the first month, but later the axillary plexuses had shrunk again. The thyroid body seemed enlarged. In the marrow of the bones of the amputated limb marked changes were noted, showing their activity in the process of reformation of the blood, vicariously to the lost spleen. The condition of the blood itself was of interest.

Hypertrophy and Rupture.—A number of cases of hypertrophy of the spleen have been put on record. Richelot¹⁴, June 14, successfully removed the organ, greatly enlarged and prolapsed into the pelvis, with numerous adhesions, in a woman aged 27. Treub¹⁷, July 18, met with like good fortune in the case of a woman aged 48, the conditions being very similar. Raymond¹⁰⁰, Nov. 10, '91, was obliged to abandon the attempt, but his patient, a woman aged 38, was materially relieved. In the case of a woman, 53 years old, Carver⁴³⁰, April, not only found removal of the organ impossible, but death from shock ensued in two hours. Von Burckhardt¹²⁸, July 16, reports three cases, all of women, with leukæmia or pseudoleukæmia, and all ending fatally. H. I. Cowan, of Kentucky, July 16, ²²⁴, reports the extirpation of a carcinomatous spleen from a woman (age not given); she died of shock in three hours.

Vincent⁹¹, January 10, discusses the prognosis and treatment of rupture of the spleen, giving two successful cases of his own, both in

persons affected with malaria. In one, a man 37 years old, the injury was due to a blow; in the other, a woman of 28, the organ gave way during an operation for its removal, undertaken with the idea that it was a diseased ovary. The author regards splenectomy as the proper course in a limited number of cases, but thinks abdominal section is generally indicated, as affording exit to effused blood and a chance of arresting its flow. Lauenstein¹³ has reported ten cases in which such adhesions required removal; one ended fatally, but complete relief was afforded in all the rest.

A case of successful removal of a spleen enlarged from old malarial disease, in a woman aged 25, is recorded by Paine, of Galveston, Tex.¹². The adhesions were numerous and vascular, especially to the transverse colon; the pedicle was secured by transfixion and ligation, besides which each vessel contained in it was separately tied. Meerowitzch²¹ reports three cases of like procedures; two of the patients were alive and well four years later, but in the third the adhesions to the mesentery and intestines were so dense as to prolong the operation to nearly three hours, and death ensued five hours afterward. Another instance is recorded by Richelot,²² and still another by Treub²³; both were in women, and terminated successfully.

An interesting case, in which a mobile, hypertrophied spleen was removed by operation, is recorded by Gangitano, of Naples.⁵⁸⁹ The patient was a married woman, 36 years old, much emaciated. No difficulty was encountered. On the second day cough was troublesome and there was a rise of temperature. On the third there was high fever, increasing in the afternoon until the thermometer marked 105.5° F. (40.8° C.); this was regarded as an accession of malarial poisoning, and treated with success by the hypodermatic injection of bichloride of quinia. The history thereafter was one of uninterrupted recovery. The author gives a brief sketch of the like operations previously performed in Europe, and of the technique, and appends a table of those done by Italian surgeons, to the number of 39, for various causes. Of these, 26 are reported as successful; certainly a very creditable showing.

Dandolo³³⁶ has given the most extensive statistics yet presented as regards extirpation of the spleen,—102 cases, with 46 recoveries and 56 deaths. Twenty-five of the latter were instances of leukæmia. The results in cases of simple hypertrophy were

also unfavorable,—18 operations, 11 deaths. So also were those of malarial disease,—23 operations, 11 deaths. On the other hand, out of 17 cases of extirpation of wandering spleens, there were only 2 deaths. The remaining 19 cases included abscess, simple cysts, echinococcus, amyloid degeneration, sarcoma, lymphosarcoma, congestion; 7 out of the number terminating fatally. In an appendix, Dandolo seeks to maintain that the much-doubted operation by Zaccarello and Fioravanti, in 1549, was actually performed.

Bland Sutton, of London,^{Dec. 17, 1882}, and Rooke, of Gloucestershire,^{Feb. 4, 1883}, each report a case of recovery after splenectomy. Both were in women, aged respectively 22 and 24.

Lawson Tait,^{July 2, 1884}, reports the removal of a spleen in a woman, aged 36, suffering from leucocythaemia. The spleen filled up the whole abdomen, and after removal weighed 13 pounds (6½ kilogrammes). The patient died from haemorrhage.

Spencer Wells,^{Jan. 29, 1889}, reports that a woman, upon whom splenectomy had been performed in 1889,^{July 13, 1890}, was delivered of a fine, healthy boy in 1891. He remarks that it is the first reported case of childbirth after splenectomy.

PANCREAS.

According to Nimier,^{Sept. 16, 1882}, pancreatic haemorrhage may occur in the substance of the organ, or the blood may be effused into the cavity of the lesser peritoneum. In the latter case a rounded swelling rapidly forms in the epigastrium and left hypochondrium. Usually the lesion is due to injury. Puncture is useless, and not free from risk; the blood-cyst should be freely laid open, its edges stitched to those of the skin wound, and drainage provided for. When blood is effused into the substance of the gland, the chances of success by surgical interference are very small.

Paul Swain, of Plymouth,^{Mar. 4, 1884}, reports a case of effusion into the lesser peritoneal cavity, in a man aged 38 years. It is probable that four months previous to the operation, when the patient had an attack of colic and constipation, a block occurred in the pancreatic duct and a retention-cyst formed, which subsequently ruptured into the lesser peritoneal sac. The cavity was opened and drained, and the patient made a good recovery.

Hulke, of London,^{Dec. 5, 1883}, gives the history of an interesting

case of pancreatic cyst. The patient, a woman aged 47 years, had long been an invalid, and had been greatly reduced by attacks of severe abdominal pain, with vomiting and constipation. An abdominal tumor was known to have existed from girlhood. When seen by Hulke the tumor filled the central region of the abdomen from the ensiform cartilage to the pubes. The abdomen was opened and the tumor found to be retroperitoneal. The pancreas was firmly adherent to its upper border, and was crossed by several large arteries and veins (splenic and superior mesenteric?). It was adherent behind to the aorta and vena cava. The cyst was tapped and secured in the abdominal wound, but death followed from shock.

Jos. Hersche, of Vienna, ⁸, reports a case of cyst of the pancreas in a woman aged 32 years. Von Hacker opened the abdomen in the median line, drained the cyst, and attached it to the abdominal incision. Recovery took place, but the fistula did not close for six months. Appended to the paper is a collection of thirty-six cases of cyst of the pancreas. Julius Schnitzler, of Vienna, ⁵⁷, continues Hersche's list, and adds four more cases.

J. C. Reeve, Jr., of Dayton, O., ⁹⁶, reports a case of cyst of the pancreas, in a farmer aged 35 years, in which there were almost no symptoms, except the tumor, which was the size of a small cocoa-nut. The abdomen was opened and the sac stitched to the parietes. Convalescence was uneventful.

A. A. Martin and J. R. Morison ⁹⁶, report a pancreatic cyst of traumatic origin, in a youth of 17 years, successfully operated upon. Sharkey, of London, ², successfully removed a cyst of the tail of the pancreas in a patient aged 35 years.

HERNIA.

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GENERAL OPERATIVE PROCEDURES.

G. R. Fowler,⁸⁶ in a very interesting paper on the radical cure of hernia, describes a modification of Bassini's method, which he terms the "crossed-suture" method. It consists in "figure-of-eight sutures of silk-worm gut, so placed that the deep and superficial layers are brought together without the use of buried sutures. The strand being secured to the needles, the latter are passed from behind forward, one through each edge of the divided lowermost layer. The latter consists essentially, in the case of an ordinary indirect inguinal hernia, of the muscular structures and conjoined tendon upon the inner margin, and Poupart's ligament upon the outer. At the point where the transversalis fascia presents itself as the floor of the canal, a fold of the latter is included in the loop. Care should be taken not to wound the femoral vessels. The needles, after emerging (the loop being drawn taut) from their respective sides, are reversed, that which passed through Poupart's ligament being now carried to the inner side and passed through the skin, again from behind forward, while that which included the inner margin of the lowermost layer, or muscular structures and conjoined tendon, is passed through the skin at the outer margin in the same manner. The thread is therefore crossed on a level with the plane which represents the space between the two layers. Upon drawing upon the ends of the threads, the loop, which includes the muscular structures and conjoined tendon upon the inner, a fold of transversalis fascia in the floor and Poupart's ligament upon the outer side of the wound, is tightened and perfect approximation of these structures results. By tying the suture over the skin the incision is completely closed." Fowler never permits a patient thus operated upon even to sit up in bed for the

first six weeks following operation. He has operated upon 33 cases by this method, 9 of which were strangulated and 4 irreducible; 1 died (strangulated), and in 1 case relapse occurred, which was attributed to extensive sloughing. He was unable to state how many cases had been traced. Two cases had been operated upon more than twenty months before, 9 more than sixteen months before, and 6 more than twelve months before.

It is difficult to see the advantage of this variation in technique over the buried suture adopted by Bassini. The weak point in the method is the withdrawing of all sutures at the end of three weeks, since firm union of tendinous structures is impossible in so short a time, as proven by the recent experiments of Busse. We fail to see any good reason for keeping a patient in bed five or six weeks, as Bassini himself has demonstrated that two or three weeks are amply sufficient, in most cases. The number of cases that healed primarily is not stated.

The best method of closure of the abdominal walls to prevent hernia has been discussed by the Obstetrical Society of Philadelphia,²³ and the Milwaukee Medical Society,¹⁹ with the usual variety of opinion. All operators agree that stitch-abscesses, the use of the drainage-tube, and leaving the recumbent position too early are factors in the causation of hernia. All insist upon stringent asepsis. As to the material for suture, more are in favor of silk-worm gut than of any other material; but some insist that it shall embrace all layers (the simplest form of suture), while others, following Halsted and Welch, use it only as a subcutaneous suture. The majority favor the accurate apposition of the fascia by separate layer of catgut; others trust to its meeting, or disregard it in the single (through all layers) suture. Reliance is still placed on the support afforded by buried catgut or wire sutures. We are of the opinion of Price, that all materials except catgut or kangaroo tendon are likely to act as foreign bodies and cause irritation eventually, and that in general the three layers of sutures—one of catgut, to unite the peritoneum; a second of catgut, for the fascia and muscles; the third of silk-worm gut, to embrace all layers but the peritoneum—is the *best method*. It must be admitted, however, that we have no clinical evidence that this plan produces any more satisfactory cicatrix than the simplest form of suture. More study of this subject is needed, and less loose statements than that

of the surgeon who, on autopsy, "found an exact cicatrix which would not, under any circumstances, allow a ventral hernia."

Thiriar¹⁴ _{Apr. 19} advocates the use of plates of decalcified bone, to be inserted over the hernial orifice after the sac has been removed, on the ground that, when absorbed, it will be replaced by fibrous tissue, which will act as a barrier to subsequent hernia. He has operated in this manner in twenty-one cases. The final results are not stated. The operation will probably meet with little favor, as it rests upon the false assumption that fibrous or scar tissue is unyielding. Schwartz¹⁴ _{Apr. 19} has attempted to close the inguinal rings by transplanting a pediculated flap of the rectus muscle behind the internal pillars of the ring. In femoral hernia he uses part of the adductor longus in the same way to "buttress" the canal and ring. His results do not extend beyond four months' observation.

Zancarol¹⁴ _{Apr. 19} has operated on thirty cases, with one relapse, the observations extending from seven years to four months. Ten times the method of Lucas-Championnière was followed (one relapse). In eight instances this procedure was modified by passing two large sutures of silk, in the form of a cross or X, through the deeper layers of the canal, and three or four additional deep sutures perpendicular to the line of incision, the skin being closed over these. Bassini's method has been practiced twelve times, and is considered the best for anatomical reasons. One case was an infant of 3 years, with epispadias, in whom primary union was obtained despite the soiling of the dressings by the urine.

Dallas²⁰⁸ divides the treatment of hernia into the palliative, "mixed," radical, and the treatment of strangulated hernia, and proposes a new truss, of the value of which he offers little or no evidence, and which does not seem at first sight to be any improvement on those in common use. For the mixed treatment he has invented an instrument for scarifying the canal, or the tissues outside the sac in the canal, through an incision made by the subcutaneous use of cocaine,—a method which will find no imitators, we fancy, since its uselessness has been already proven. For the radical cure he has nothing new to offer; and, after insisting with propriety on the disadvantage of most of the adjuvants to the taxes in strangulated hernia and the advantage of early operation, recommends, in the recumbent position, the subcutaneous injections of morphine gr. $\frac{1}{2}$ (0.016 gramme), atropine gr. $\frac{1}{2}\pi$ (0.00054

gramme), cocaine gr. $\frac{1}{8}$ (0.008 gramme) in the neighborhood of the rupture, to be repeated every fifteen minutes till the patient is comfortable. The patient meantime is to drink, every five minutes, 2 to 4 ounces (62 to 124 grammes) of a hot mixture of strong coffee fld. pt. 1 (500 grammes), ext. ergot 2 to 4 drachms (8 to 16 grammes), and, when the pulse is weak and compressible, strychnia gr. $\frac{1}{60}$ (0.0013 gramme). These measures may be continued for two half-hours, and, if unsuccessful, operation should be resorted to. This plan seems to deserve the same criticism which the author has passed on other adjuvant methods. Morphine hypodermatically and locally are the only remedies that are entitled to confidence while preparations for herniotomy are being made.

F. O. Summers,¹² who has "operated with satisfactory results upon a sufficient number to report positively upon the subject," relies upon cocaine anaesthesia, invaginates the scrotum and retains it in place with silver wires over a compress. The sutures are removed at end of a week. The dartos and tunica plug the canal, and offer a permanent obstruction to the passage of the intestine. This is a revival of a procedure long since found unreliable and abandoned. Rushton Parker,⁸⁰ in a series of 250 radical-cure operations for all kinds of hernia, computes a mortality of 4.2 per cent. (8 deaths in 190 non-strangulated cases) attributable to the operation, there being, in 137 inguinal cases, 5 deaths; in 25 femoral, 1 death; and in 28 umbilical and ventral, 2 deaths. Parker concludes that the radical cure of inguinal hernia in infancy and childhood can be attained with ease and almost with certainty, and that early operation should be urged; that the cure of inguinal and femoral hernia in men and women is possible in the large majority of cases, the exceptions being sometimes large hernia, sometimes small; that Macewen's operation is the best for inguinal and femoral hernia at all periods of life; that the umbilical hernia of adults is proportionately much less capable of radical cure than inguinal and femoral; and that the radical cure is, as a rule, applicable both to strangulated and non-strangulated hernia.

Gale⁵⁴⁷ makes the novel proposition—which, we fancy, few will adopt—of placing the patient in the upright or semi-prone position in attempting taxis. He assumes that in these positions the canals and hernial orifices are more relaxed than in the recum-

bent position, and that patients usually reduce their hernia while standing. While cases may occasionally be reduced, after the lapse of a few hours, with the use of opium and ice or even warm applications (in children, particularly), operation is generally indicated.

Bull and Coley⁹⁶ contribute some observations on the mechanical and operative treatment of hernia, their paper being based on a study of 9250 cases treated at the Hospital for Ruptured and Crippled, New York, during the past two years, mostly by mechanical means. About 80 cases, of which 40 were children under 14 years, were subjected to operative procedures. The method employed in most cases was Bassini's, with the substitution of kangaroo tendon for silk in the buried sutures. The results, both immediate and final, were uniformly successful, although sufficient time had not elapsed to determine the number of permanent cures. The authors state that in a total of 2197 cases operated upon by eighteen different surgeons, the mortality was 1 per cent.; 56 cases of relapsed hernia followed eleven different methods of operation, the largest number being the McBurney method. They state, however, that "these relapsed cases have little bearing on the question of the comparative reliability of different procedures," and conclude that "all 'open methods,' or operations in which the wound is left to heal by granulation, should be discarded, and that the feature of every operation should be rapid *primary union*." Ventral hernia following abdominal section was observed in 60 cases. Among the cases deserving special note were 9 cases of hydrocele of the canal of Nück; 1 case of properitoneal hernia; 1 case with five herniæ,—double inguinal, double femoral, and umbilical; 4 cases of testes in the perineum; 8 cases of femoral hernia in children under 14, 3 under 7 years.

Coley⁵⁹, discusses the operative treatment of hernia in children, and reports 50 personal cases, treated at the Hospital for Ruptured and Crippled, of New York, with no mortality (except one strangulated) and but 2 relapses. The larger number of cases (32) were operated upon by the Bassini method, the results of which, in children, were most satisfactory. All but 2 cases healed by primary union, relapse occurring in these 2 only, one following the Bassini and the other the Czerny method. In both cases silk was used. Kangaroo-tendon (buried) sutures were used in nearly all of the remaining cases. Six of the cases were of the

cæcal variety and 2 were femoral; 4 were strangulated (2 *cæcal*). In 3 cases undescended testis was present as a complication. Nearly all were operated on less than two years ago, and hence it was too early to warrant a proper estimation of final results; yet, when compared with 16 cases operated upon at the same hospital, two years before, by the simpler methods of Socin and Czerny, with buried catgut sutures, which showed 6 relapses within the first year, the contrast is in favor of the newer methods. Coley has operated upon 60 cases, including adults, by Bassini's method, with no deaths and one relapse. The indications for operation in children are (1) cases of adherent omentum; (2) cases complicated with reducible hydrocele; (3) irreducible and strangulated cases; (4) cases unable to obtain care necessary for mechanical treatment; (5) cases where mechanical treatment has been faithfully tried a number of years without success. He collected 250 cases of children under 14, operated upon for radical cure, the mortality being less than 1 per cent. and the percentage of permanent cures greater than in adults. He believes that most cases in children can be cured without operation, the 50 cases upon which he had operated having been selected from upward of 4000 cases of hernia in children under 14 years of age.

Leuw²²⁶ publishes an exhaustive monograph upon the results of radical operations for non-strangulated hernia at Kocher's clinic, Berne. Kocher has operated upon 122 herniæ in 106 persons between the ages of 9 months and 71 years, with but one death, and that on the fifteenth day, and not due to the operation. These results compare favorably with those of Macewen, Bassini, and Championnière, and are a great improvement over most of the earlier operators; for instance, Czerny, 3 deaths in 32 cases; Leisrink, 7½ per cent. of deaths in 202 cases; and Billroth, 6½ per cent. in 134 cases. As to final results, relapses occurred in 19 per cent. of inguinal and 33½ per cent. of femoral. As most of the data appeared a year ago, and have already been noted in the ANNUAL, no further details need be given here.

Marcy⁶, gives an analysis of 133 cases of hernia operated upon for radical cure, with no mortality, and, as far as traced (78 cases), only 6 relapses. One-third of the entire number had been under observation ten years. He also gives a brief abstract of the most recent papers upon radical-cure operations. Marcy attempts to

reconstruct the canal, and uses buried sutures of kangaroo tendon, to which he attributes, in great measure, his very excellent results.

Schede,⁵⁷ July 22 has operated upon 11 umbilical herniæ, 3 herniæ of the linea alba, and 13 ventral herniæ. In all cases the sac and the underlying skin were completely removed. He has also operated upon 48 inguinal incarcerated herniæ with 6 deaths, 6 irreducible with no deaths, 68 reducible with no deaths and but one recurrence ; of 34 femoral incarcerated, 3 died ; of 4 irreducible femoral, 1 died ; of 24 reducible femoral, all recovered, with but 1 recurrence. The sac was extirpated, the canal closed with six or eight buried sutures (silver wire), and the superficial layers united with catgut. No drainage was employed. Most of the cases healed by primary union.

Abrik Lind, of Göteborg, Sweden, gives the statistics of all the cases of hernia treated at the Sahlgren Hospital from 1883 to 1893⁵⁸; 151 cases were reducible, 155 incarcerated. In 193 the rupture was inguinal and in 107 crural. Of the non-strangulated cases, 140 were operated upon, with 2 deaths ; in 5 the Bassini method was used, and in 2 of these the silk sutures were cast off, leaving slow-healing sinuses. Eighteen children under the age of 3 years were operated upon, and among these one aged 5 months and another 7 months. Two were operated upon for double hernia at one operation. Among the contents of hernial sacs were the cæcum, appendix, tubes, and ovaries. Three cases of umbilical hernia in newborn infants were operated upon ; two of these, in which various organs were adherent to the sac, died, while the third lived. Of the 155 cases of strangulated hernia, 33, or 21 per cent., died. In 22 cases the hernia was reduced by taxis ; one of these died of gangrene of the intestine. One hundred and thirty-three were operated upon, with 24-per-cent. mortality. The mortality rate for the last four years was 18½ per cent., and for the last two years only 9½ per cent., due largely to the fact that cases entered the hospital earlier and had greater confidence in operation. Of those operated upon, 67 were between the ages of 60 and 80 years. Gangrene was observed in 28 cases.

Mayo Robson¹⁵ states that the following conditions may give rise to persistence of symptoms after the apparent reduction of a hernia, and may demand the performance of median abdominal section : (1) reduction *en masse* ; (2) non-recovery of gut with con-

secutive enteritis; (3) gangrene of bowel; (4) an internal strangulation within a hernial sac, the taxis having overcome the external stricture; (5) hour-glass contraction of sac and reduction of hernia from the outer compartment into the inner, but not from this into the peritoneal cavity; (6) the presence of a second hernia which has escaped observation. He records two cases (one umbilical, one femoral) operated on with success; while Barker¹⁰⁷⁷ reports a successful case of inguinal hernia relieved by median section on the third day, and argues in favor of this procedure rather than an exploration over the hernial site,—an argument which will be generally accepted. Brown,⁵⁵⁷ finding it difficult to reduce the stump of a ligated omentum in an irreducible inguinal hernia, resorted to median section, made traction upon the mass, and easily accomplished reduction.

The accidents attending resection of omentum in operations for hernia are stated by Bull⁹⁰ to be (1) bleeding from inefficient ligature; (2) damage to neighboring intestine from faulty application of the ligature; (3) inflammation and abscess of the omental stump. He recommends the use of catgut in place of silk, the tying of small masses of this treacherous tissue, and the cutting of the stump of omentum as close to the ligature as is safe. Four cases of resulting inflammation of omental stumps are recorded. Two other cases, after serious symptoms of local peritonitis, required incision of the stumps, and another gave rise to general suppurative peritonitis, resulting in death. Shaw⁶ reports a fatal case of peritonitis (following radical-cure operation) due to sloughing of a small stump of omentum.

STRANGULATED HERNIA.

Guilio⁴⁵¹ relates a case of strangulated adipose hernia. The patient had had a small irreducible tumor in the right groin for nine years. The last year it had doubled in size and had been attended with colicky pains. Finally, unmistakable signs, local and general, of strangulation occurred, and operation was performed. The intestine only was found congested. The fatty tumor was firmly adherent to the neck of the sac, and on removal weighed 180 grammes ($5\frac{3}{4}$ ounces). The author believes that in this class of hernia a fatty tumor forms in the crural canal, dilates the ring, causes inflammatory adhesions to the peritoneum, and

later, by continued traction, may be the initial cause of the formation of a hernial sac. It seems more rational to believe that the trouble started as an irreducible omental hernia which, in some cases, has been known to become entirely separated from the main omentum by long-standing constriction. Annequin²⁴⁸,⁹ ~~Jan., 1885~~ reports a case of strangulated diaphragmatic hernia in which diagnosis was not made until the autopsy. A knuckle of large intestine, together with a portion of omentum, had made its way through the diaphragm behind the gastro-spleenic omentum. Death occurred four and one-half days from the onset. Bush, of Fort Davis, Texas,¹⁹⁹ ~~Sept.~~ reports a case of strangulated hernia in which the sac contained, in addition to a loop of intestine, an ovary and tube.

Grant¹,² ~~July 22~~ states that the following conditions demand operative treatment at once: All herniæ certainly strangulated twenty-four hours, even without vomiting; all herniæ certainly strangulated in which vomiting comes on late after pain and obstruction, indicating constitutional disturbances; all strangulated herniæ that have been manipulated, in which vomiting has occurred; and those in which there are symptoms of collapse. Given a dangerously-damaged gut, three questions arise,—viz., whether to temporize, to make an artificial anus, or to resect. Seventy-one cases are reported from the current literature of 1892 and 1893, and from private communications to the author, with the following results of operation: Artificial anus, 5 recoveries, 10 deaths; return of bowel after it looked safe, 4 recoveries, 5 deaths; resection, 22 recoveries, 25 deaths.

Graff¹⁰⁵,¹⁶ advises Senn's intestinal anastomosis in operations for strangulated hernia, and cites three cases. The author concludes that the anastomosis was perhaps unnecessary in the first case, but it permitted a return of the suspected bowel with safety and confidence. In the second, the result was excellent. In the third, death took place from peritonitis caused by a technical error during operation. Post-mortem disclosed a minute perforation at the point where the invaginated afferent bowel joined the mesentery.

McLaren, of Port Huron, Mich.,¹⁸⁶ advises a new method of treating strangulated hernia, viz., injecting glycerin into the hernial sac (3 or 4 drachms—12 to 16 grammes), followed by attempts at reduction by taxis. He claims that this renders the use of the knife unnecessary. This so-called operation is based upon the fact

that glycerin quickly liquefies large masses of faeces. The author fails to appreciate the ordinary causes, as well as the conditions usually present in strangulated hernia. Hard masses of faeces are so rarely present that they may be entirely left out of consideration.

The mortality following operation in strangulated hernia in the leading English hospitals is given by Bowlby¹⁸, as upward of 40 per cent. In 940 cases treated at St. Thomas's, Guy's, and St. Bartholomew's it was 43 per cent. At the London Hospital it was nearly 50 per cent. Even in recent years he concludes that the mortality in the four largest hospitals in London is not less than 40 per cent. He ascribes this high mortality not to the operation, but to the time allowed to elapse between strangulation and operation, and says that the mortality need not be greater than 5 or 10 per cent. Hardly any patients die from the operation itself. In cases operated upon during the first twelve hours the mortality is trifling.

The following cases are reported: Binaud,¹⁸⁸, strangulated inguinal hernia; three days. Woman, 65 years. On opening sac a yellowish, suspicious-looking fluid escaped; loop of intestine, much congested, reduced. A small mass found adherent to outside of sac. Incision into this mass opened up the bladder. Bladder wound closed by three lines of sutures. Patient died two days later from pulmonary congestion. Autopsy proved vesical sutures to be sufficient, as injections into the bladder under pressure caused no oozing. Annequin.²⁴³ Symptoms for three days of intestinal strangulation before entering hospital. General condition too critical for operation. Died thirty-six hours after admission. At autopsy, in left side of thorax was found hernia size of fist, situated between the heart and a part of the lung, which was adherent to the lower fourth of the thorax. The mass consisted of a large piece of omentum enveloping a loop of intestine—the angle formed by the transverse and descending colon. No apparent sac. The omentum was adherent in its upper part to the diaphragm and lung. The strangulated loop was red and inflated with gas; blackish at neck; the button-hole was very tight, the omentum being adherent to it. Treves.²² Strangulated femoral hernia in a woman aged 36. Sac contained gangrenous intestine, faecal matter, and pus. The gut was freely opened, the constriction undisturbed. Death is probable in this case, the recoveries from this condition

being 40 per cent. Meyer.²⁰ Gangrenous Littré's hernia; strangulated six days. Woman, aged 69 years. Laparotomy and longitudinal enterorrhaphy. Abdominal wound left open. Recovery. Martel.²¹ Successful operation for strangulated inguinal hernia. Patient developed symptoms of general peritonitis and died. Autopsy revealed inguino-properitoneal hernia with torsion of mesentery. Demons.²² Male, aged 36 years. Strangulated inguinal hernia of three days' duration. Gangrenous omentum occupied hernial sac. As much of the gangrenous tissue was removed as could be drawn down through ring. Day following operation two abundant stools, but on second night grave general symptoms. Cœliotomy performed. Entire omentum gangrenous and twisted four times upon itself. A strong ligature was applied at the point of torsion and entire omentum removed. Perfect recovery. Heaton.²³ Case 1. Male, aged 57, in feeble condition. Hernia, inguinal, irreducible for several years, strangulated four days before operation. Sac contained some bloody fluid; no constrictions at either ring, but a coil of intestine was strangulated by a fibrous band spanning the sac. A portion of this intestine, about an inch in diameter, was gangrenous. Treated as in inguinal colotomy. On the second day after the operation the gangrenous area was excised, having increased considerably in diameter. Fæces passed freely from the artificial opening; no abdominal tenderness or distension. Patient became gradually weaker; death on tenth day after operation. Post-mortem revealed artificial tight anus far up in small intestine. Case 2. Female, aged 50. Large, irreducible, umbilical hernia for many years. Strangulated seven days. Sac contained fæces, pus, gangrenous omentum, and a coil of gangrenous intestine about three feet long. This was opened. Death in a few hours. Case 3. Large, right, inguino-scrotal hernia, irreducible eighteen months, strangulated three days. Patient male, aged 34. Fetid fluid. Mass of dark-colored omentum, small knuckle of gangrenous intestine. Omentum was removed and stump returned, the intestine slipping back with it. This could not be recovered. Glass drainage was introduced, which carried off faecal discharges for two weeks, foul pus for one week. Four months after operation a small sinus remained, discharging about a drachm (4 grammes) of pus daily. Reckitt.²⁴ Strangulated hernia, in infant 8 months old; treated by operation, with recovery. No attempt at radical cure.

Wyman.⁹⁶ Strangulated obturator hernia; cured by operation. Demoulin.¹⁷ A woman aged 52 years; femoral hernia, strangulated for thirty-six hours. During the operation, in making traction upon the peritoneum, a mass about the size of a pigeon's egg and covered with yellow fat was brought down to the inner side of the hernial sac. It proved to be a portion of the bladder, extra-peritoneal. Recovery. Lane.²² Strangulated femoral hernia, closely simulating the obturator variety, from extensive attachments of pectineus to Gimbernat's ligament and to inner part of Poupart's ligament. Laplace.⁷⁶⁰ Symptoms of intestinal obstruction. An incision was made; the intestine examined, foot by foot, until the last knuckle of the duodenum was reached. This was found strangulated by torsion. The condition was corrected. Recovery uneventful. Williamson.² Inguino-scrotal hernia, strangulated about thirty-six hours. Taxis, aided by opium, asa-fœtida, hot fomentations, turning patient upside down, and large injections of olive-oil. Condition normal for a week, when symptoms of internal strangulation occurred, probably due to invagination. Treatment as before, save position. Recovery. Marsh.⁸² Male, aged 32. Symptoms of internal strangulation for four days. Right inguinal hernia, of seven years' duration, but was well held by truss. On opening the abdomen a band was found strangling a large coil of small intestine, extending from the site of the old hernia to the veriform appendix. The intestine was freed and the veriform, which was much thickened, removed. There had been no symptoms of appendicitis. Recovery uneventful, but slow. The author attaches great importance to the regular administration from the first of nutritive and stimulating enemata after operations for strangulated hernia. Vance.²²⁴ Woman, aged 25 years. History of right femoral hernia, for two years held by a truss; this had been removed. Hernia was "incarcerated" eight days before operation. Sac contained a portion of the ileum, gangrenous and ruptured, and a pint (500 grammes) of faeces. Resection was done. Death, sixty-two hours after operation, from septic infection. Schmidt.³³⁶ Male, aged 61. Richter's hernia; right femoral gangrenous. Herniotomy on ninth day of strangulation. Sac contained turbid fluid of quite faecal odor. A part of intestinal wall about three-fourths inch in diameter was exposed; distinctly gangrenous. Stitched to upper angle of the wound; lower

angle closed with usual sutures. Constricting ring was not incised. Fistula closed at the end of fourth week. Recovery uneventful. This procedure is suitable only for cases of Richter's hernia. Ohlmus.¹⁷⁴ Operation ten days after strangulation. Male, aged 28. Hernia right inguinal, five to six inches greatest diameter. On opening the sac about an ounce (30 grammes) of dark, faecal-tainted fluid escaped. Omentum and gut were deeply congested; no signs of gangrene; gut returned. Omentum and sac ligatured and removed. Recovery complete on fifteenth day subsequent to operation. Rimmer.¹⁸⁶ Inguinal hernia, congenital, strangulated seven days; stercoraceous vomiting for five days. Patient, male, aged about 45. History of frequent strangulations. Constricting ring cut through; bowel found adherent to testicle. Adhesions broken up and intestine, deeply congested and containing two or three large faecal masses, returned to the abdominal cavity. Peritoneum closed with silk. Sutures removed on thirteenth day. Healing perfect.

GANGRENOUS HERNIA.

Considerable light is thrown upon the treatment of gangrenous hernia by Zeidler, of St. Petersburg.³³⁶ His conclusions are based upon two hundred and eighty-nine resections for gangrenous herniae. These cases are compared with two hundred and eighty-seven cases in which an artificial anus was established. The mortality in the former group is $49\frac{1}{10}\%$ per cent.; in the latter, $74\frac{2}{10}\%$ per cent., or 25 per cent. greater. In analyzing the causes of death, the advantage is, in each instance, in favor of primary resection. The author regards the presence of diffuse peritonitis and profound collapse as almost the only contraindications to resection.

Rovsing, of Copenhagen,⁶⁷³ describes and advocates Poulsen's method of treating gangrenous and possibly-gangrenous hernia. It consists in freely drawing forth the intestine and keeping it under observation for a short period. If it remain normal, it is replaced; if it sloughs, an artificial anus is made. He reports one case of suspicious gangrene treated in this way, with recovery; while two others, of certain gangrene, died, one the day following the operation, and the other a few weeks after, apparently of sepsis.

Schramm¹¹⁹ reported two cases of gangrenous hernia in children, aged 12 and 9 years, respectively, treated by primary resec-

tion. In the first case fifteen centimetres were resected. The boy left the hospital cured at the end of ten days. The second case was of strangulation by a band in the ileo-cæcal region. Nine centimetres were resected, and the intestine united by three rows of sutures. The next day, the distension increasing, the wound was opened, the intestine brought out, incised, and a drainage-tube half a metre long inserted into the intestine. This allowed the escape of much flatus and 2 litres (2 quarts) of fæces. The patient recovered, and left the hospital three weeks later with a small fistula. The author cites these cases as showing that children bear resection in gangrene very well, and that in gangrenous hernia resection and enterorrhaphy is the correct procedure.

UMBILICAL HERNIA.

Berger,⁹¹ reports two very interesting cases of hernia of the umbilical cord. The first was in a female infant 28 hours old. The umbilical region was occupied by a tumor, the size of a small hen's egg, a portion of which was irreducible. Chloroform was given, and an incision made in the linea alba. The hernia consisted of the small intestine; the cæcum and transverse colon were adherent. These were returned within the abdomen, and the incision closed by three layers of sutures. The first series were of catgut, and united the edges of the peritoneum and aponeurosis; the second series united the edges of the muscles; the third series were of silk-worm gut, and united the edges of the skin. No drainage was used. Union took place by first intention. The second case was in a female infant 3 days old. The umbilical tumor was the size of a large walnut and irreducible. Chloroform given. Incision as in first case. Contents small intestine with cæcum adherent. Reduced, and incision closed as above. Union by first intention. Cure. The author's paper is very instructive, and contains a complete list of all reported cases, seventy-seven in number.

A case of umbilical hernia with properitoneal sac is reported by Savariaud¹⁴ in a woman aged 47. The hernia was irreducible, and, after opening the sac and returning the adherent intestine omentum, a second properitoneal *cul-de-sac* was found by Quénat, the operator. Gangrene of the intestine (colon), caused by torsion within the sac of an umbilical hernia, is noted by Makins,⁶ who resected a fourth of the transverse colon and made

an artificial anus. Recovery. Patient 79 years of age; duration of symptoms of strangulation, seven hours.

Le Dentu ¹⁰⁰_{Jan. 10; June} states that umbilical hernia differs from other herniæ in the frequency of adhesions; the peritoneum very early becomes adherent to the edges of the ring, as does also the omentum. As the hernia increases the peritoneum forming the sac becomes more and more stretched, until it forms a very imperfect covering. The intestines are often adherent, and later may become adherent to the skin. These adhesions are so intimate as to be at times most difficult to separate. The sac may contain a portion of the stomach, especially when dilated. When strangulation occurs it is most serious. Recurrence after operation is rather frequent.

Dudley ²⁷_{Feb.} comments on the discomforts and risk attending the mechanical treatment of umbilical hernia, and thinks (rightfully, we believe) that the radical operation should be attempted before irreducibility or strangulation has occurred. After failure with buried silk sutures he has followed this plan: Suture of the peritoneum with continuous catgut after reduction of the contents and resection of the sac; suture of the edges of the linea alba, first with catgut and then with silver wire, the ends of which are left projecting through small cannulæ (Emmet's method) and held firm by interrupted sutures of the skin and subcutaneous fat. The wounds in three cases (one of which died) healed primarily, and the cannulæ and silver sutures were removed at the end of three weeks. A belt was applied after each operation.

Lindfors ¹³_{Sept. 15} has collected 31 cases of hernia of the umbilical cord, 7 of which were treated on the expectant plan, with 4 (59 per cent.) deaths; 24 cases were operated upon, with 4 (16 per cent.) deaths. The operation, therefore, offers the best prognosis; it consists in excising the sac, freshening the edges of the ring, and then suturing. Rabagliati ²⁸_{July} has had success by suturing the peritoneum with catgut after resecting the sac, stitching the fascia with silk-worm gut (buried), and, over this, the skin with catgut. He has "seen or operated on about a dozen such cases," but gives no evidence of the duration of his successes. An excellent *résumé* of various methods for umbilical hernia is given by Brodier, ¹⁰⁰_{Aug. 28} who concludes that all can be practically reduced to one and the same plan,—suture of the umbilical ring, either with or without resection of its edges. The former means opening the sheath of the

rectus. Duret²²⁰ _{Feb. 10} reports a large umbilical hernia cured by operation, suturing the three layers of the abdominal wall separately. The same method has been practiced and advocated by Condamin,²¹¹ _{Oct. 30, 1882} whose paper²¹¹ ₁₈₈₃ contains valuable hints as to other details of the operative procedure.

Alsberg²²⁰ _{Nov. 17, 1882} performed the radical operation for a persistent Meckel's diverticulum in a male infant 18 weeks old. The umbilical cord had fallen away, but the wound refused to heal. A small tumor appeared, the size of a walnut, and at its centre an opening, from which there was a constant yellowish discharge. A bougie the size of a knitting-needle entered to the depth of twenty centimetres. Chloroform. Circular incision around the umbilicus. The diverticulum, which was five centimetres in length, was dissected from the umbilical opening and resected one-half centimetre from the point of attachment to the intestine. The opening to the intestine was closed with silk sutures. For the first three days the patient did very well, but on the fourth day peritonitis developed, and death took place on the twelfth day. It is presumed that the opening into the intestine was not securely closed.

Two cases with successful operation are reported by Warren,⁵¹ _{Aug.} who collects all those previously recorded. His first case was laparotomized twenty-four hours after birth, and the sac found to contain the liver. Three months after operation a relapse had occurred. The second case was subjected to operation three hours after birth and the greater part of the small intestine replaced. The gut was covered with the adherent myxomatous tissue of the cord, which was dissected from it with difficulty. Both wounds were closed with silk sutures. These cases are worthy of notice as showing the resistance to operations, which are generally life-saving, in such young subjects; and they are triumphs of surgical skill and promptness.

A similar case in which reduction was successful is recorded by Vanderpoel.⁸⁶⁸ _{Oct. 18, 1882} At birth the tumor in the cord was the size of the fist, and its coverings were so transparent that the liver, stomach, and intestine could be seen. After surrounding the orifice with a purse-string suture of catgut, reduction of the contents was made, the suture tightened, and the sac and cord beyond it ligated. Healing took place by granulation, during which double inguinal hernia with hydrocele developed.

In reporting a case of death after operation for strangulated umbilical hernia, Stewart²⁸⁴ collects all the cases of herniotomy recorded from 1879 to 1889 in the *Lancet* and *British Medical Journal*, 545 in number,—328 inguinal, with 28 deaths (8.5 per cent.); 154 femoral, with 22 deaths (14 per cent.), and 52 umbilical, with 14 deaths (27 per cent.). Of the 52 umbilical, 36 were strangulated, 9 were operated for radical cure, without a death; 34 were operated for strangulation, with 7 deaths (about 20 per cent. mortality). M. S. Marcy¹¹⁵ reports a case of umbilical hernia, strangulated for six days, cured by herniotomy. The patient was a woman of 32, weighing 240 pounds (120 kilogrammes), the adipose tissue fully six or eight inches in thickness, the contents of the sac being the omentum (thickened) and small intestine, with numerous adhesions. Another successful operation is reported by King,⁴⁵¹ the umbilical hernia being strangulated and of the size of a child's head, in a corpulent woman of 33 years. The sac contained omentum and intestine. After reduction, the sac of the orifice and skin was sutured with catgut, a belt applied, and there was no relapse a year after operation.

DIAPHRAGMATIC HERNIA.

Marshall²¹⁸ reports a case of congenital diaphragmatic hernia in a child born at full term, but which did not breathe, but gasped a few times and died. Autopsy showed the spleen, pancreas, Spigelian lobe of liver, great intestine, colon, and vermiform appendix to be present in the pleural cavity. Hansemann⁴¹ observed a case in a newborn infant which lived four hours. At the autopsy, only the liver, stomach, and the ascending colon were found in the abdomen. All of the other organs had entered the left pleural cavity through an opening in the left side of the diaphragm. The left lung was entirely compressed; the heart was entirely upon the right side and had compressed the lower lobe of the right lung.

Abel⁸⁴ operated upon a female patient aged 33, who had complained of pain in the left side, in the region of stomach, for two days previously; the bowels were constipated, and there was pain over the stomach on firm pressure, becoming worse next day. She vomited; the pulse was small and feeble; tympanites over entire left chest. Abel attempted to wash out the stomach, but

the tube would not enter. An incision ten centimetres long parallel with the ribs was made, the hand passed inside; it entered through a large opening through the diaphragm into the left pleural cavity, where a portion of the omentum and large intestine were found, and the stomach, which was so turned upward as to constrict the œsophagus, thus indicating why the stomach-tube failed to enter. There were numerous firm adhesions which could not be separated. Patient died in three hours.

INGUINAL HERNIA.

Halsted⁷⁸⁴ describes as follows his method of radical cure of inguinal hernia in the male: " Bassini's operation and my own are so nearly identical that I might quote his results in support of my operation. Instead of trying to repair the old canal and the internal abdominal ring, as Macewen had tried to do, I make a new canal and a new ring. The latter should fit the cord as snugly as possible, and the cord should be as small as possible. The skin incision extends from a point about five centimetres above and external to the internal abdominal ring to the spine of the pubes. The subcutaneous tissues are divided so as to expose clearly the aponeurosis of the external oblique muscle and the external abdominal ring. The aponeurosis of the external oblique muscle, the internal oblique and transversalis muscles, and the transversalis fascia are cut through from the external abdominal ring to a point about two centimetres above and external to the internal abdominal ring. The vas deferens and the blood-vessels of the cord are isolated. All but one or two of the veins of the cord are excised. The sac is carefully isolated and opened and its contents replaced. A piece of gauze is usually employed to replace and retain the intestines. With the division of the abdominal muscles and the transversalis fascia the so-called neck of the sac vanishes. There is no longer a constriction of the sac. The communication between the sac and the abdominal cavity is sometimes large enough to admit one's hand. The sac having been completely isolated and its contents replaced, the peritoneal cavity is closed by a few fine silk mattress sutures, sometimes by a continuous suture. The sac is cut away close to the sutures. The cord in its reduced form is raised on a hook out of the wound to facilitate the introduction of the six or eight deep mattress sutures, which pass through the

Steps of operation for Inguinal Hernia (Halsted).

Johns Hopkins Hospital Bulletin.



aponeurosis of the external oblique, and through the internal oblique and transversalis muscles and transversalis fascia on the one side, and through the transversalis fascia and Poupart's ligament and fibres of the aponeurosis of the external oblique muscle on the other. The two outermost of these deep mattress sutures pass through muscular tissues and the same tissues on both sides of the wound. They are the most important stitches, for the transplanted cord passes out between them. If placed too close together the circulation of the cord might be imperiled, and if too far apart the hernia might recur. They should, however, be near enough to each other to grip the cord. The precise point out to which the cord is transplanted depends upon the condition of the muscles at the internal abdominal ring. If in this situation they are thick and firm, and present broad, raw surfaces, the cord may be brought out here. But if the muscles are attenuated at this point, and present thin, cut edges, the cord is transplanted farther out. The skin wound is brought together by buried skin sutures of very fine silk. Instead of the interrupted buried skin suture as shown in Fig. 3, we now use an uninterrupted buried skin suture without knots, which is withdrawn after two or three weeks. The transplanted cord lies on the aponeurosis of the external oblique muscle and is covered by skin only. In both of the patients presented you will feel the cord in this situation distinctly. They were operated upon two and three and one-half years ago."

The results of this method, as to mortality and the prompt healing of the wound, are very satisfactory, 82 operations being without deaths. One may, however, question the advantage of Halsted's complicated sutures when it is noted that in 20 cases there was suppuration or stitch abscess. In the matter of recurrence, the statistics are far inferior to those presented by Macewen, Bassini, or Lucas-Championnière. He says, "Of the cases which healed *per primam*, not one recurred"; and neglects to analyze the cases with reference to the time which has elapsed since the operations were done. Of 58 patients the result is unknown in 13, 28 have been under observation one year or less (15 having only about one month's history), and of the remainder there are but 6 cases which have been without relapse, for a period exceeding two years, the longest period being two years and five months. The latest observation is a *relapse* at the end of three years, which

is attributed to the patient's premature discharge from hospital and getting out of bed. So far as the cases have been traced, the results are excellent, but more time without relapses must transpire before the method can be considered superior to others. Thompson,¹⁴³ following a method practically identical with that of Halsted, has operated on twenty cases, none of which have been followed over one year. No recurrences have been noted.

Nicoladoni⁸³⁸,_{supr.} reports 100 cases of inguinal hernia operated upon by Bassini's method. Ninety-four healed by primary union, 5 suppurred, and 1 died, on the sixteenth day, of pyæmia from "septic sutures." The youngest patient was 2 years old, and the oldest 65 years. All operations were done during the last two years, and the after-results were not stated.

O'Hara, of Melbourne,²,_{Dec. 10, '92} describes a new method of radical cure for inguinal hernia and reports 60 cases, ranging in age from 14 months to 73 years, all of which recovered without the necessity of wearing a truss. The operation, or the distinctive feature of it, consists in fixing the upper portion of the divided sac at a point about two inches above the internal ring, by means of a heavy cat-gut or silk ligature, which is brought out through a small skin incision at the point mentioned. Although he has reported 60 cases, an examination of his tables shows that no case was traced beyond six months,—a period manifestly too short to enable one to form any conclusions as to the value of the procedure. Suppuration occurred in 20 per cent. of the cases, and in 4 the results, immediate or final, were not given.

Boursier¹⁸⁸,_{Dec. 4, '92} describes the case of a patient, aged 60 years, suffering from oblique inguinal hernia for eight years, reduced by a truss. While at work the hernia came down and at once became painful. Patient reduced it, but symptoms of obstruction continued for seven days. At this time the external abdominal ring was free, but a tumor was detected just above the femoral arch. Within the abdominal cavity was found the thickened, inflamed hernial sac containing a dark loop of intestine and a little mesentery. Slight muscular contractions were noted in intestine, which was reduced and the sac removed. Wound-dressed. Drainage. Recovery.

Baxter⁹⁶,_{Mar.} proposes the following procedure: Prolongation of the incision through the internal opening upward, with a more or less extensive laparotomy, as the exigencies of the case may

require; dissection of all or a portion of the sac from all attachments within the canal; lifting the sac outward into the abdominal incision above the ring, and fixing it there; subsequent closure of the abdominal canal and scrotal incision. One patient operated on was at work in six weeks. Handley⁸⁶ prefers for infants the "hank" truss, which, he thinks, will effect a cure in six months; for children of 18 months, an elastic truss, to be worn about two years; and McBurney's operation for the radical cure. MacCormac¹⁰⁷⁷ has an original and very possibly effective mode of closing the canal. After pulling down the sac and ligating its neck as high up as possible, catgut sutures, five or six in number, are introduced as follows: The sutures are passed under the guidance of the forefinger of the left hand, on the tip of which the structures on each side of the canal are lifted up and steadied. The needle is introduced from without inward, half an inch from the margin of the canal on the inner side, and passed through all the layers of the abdominal wall, ex-

METHOD OF CLOSING THE CANAL. (MACCORMAC.)
The Clinical Journal.

cept the peritoneum, and brought near to the centre of the anterior wall of the canal, threaded, and withdrawn. This manœuvre is repeated at intervals of half or three-fourths of an inch, until a sufficient number of sutures have been passed, including, of course, the conjoined tendon. The needle is then similarly passed from the outer side so as to include Poupart's ligament and the tissue on the outer side of the canal, the point of emergence being near the middle line and margin of the external ring. The needle is now threaded, with the end of the corresponding suture already intro-

duced from the inner side, and then withdrawn, carrying the thread with it. The sutures, when thus introduced, present the appearance shown in the wood-cut. In fifteen cases there was no relapse after periods varying from four to eighteen months.

Berger,¹⁵² _{Nov., 1888; Mar.} ¹⁵⁷ gives the statistics from 10,000 cases, in 111 cases of which in males and 70 cases in females there were simultaneous inguinal and crural hernia on opposite sides in the same individual. Among 10,000 cases there were 225 cases in males and 15 cases in females where an inguinal and crural hernia occurred upon the same side in the same individual. These herniae are usually observed in weak and lean individuals, very often in old men with chronic affections of the air-passages. The inguinal hernia is usually direct; the whole inguinal region is pushed forward and two separate sacs arise only when Poupart's ligament does not yield. The openings are wide and the herniae reducible; incarceration was not observed. It was difficult to retain the herniae with a truss.

De Lautour⁵⁵⁷ reports a case of hydatid cyst bursting through the internal inguinal ring. The patient, a male aged 47, with no previous sickness, two weeks previously noticed a lump the size of an English walnut in the right groin. It was not painful, but grew larger, occupying an area five inches by three inches; the skin covering this tumor sloughed, simulating in its general appearance a large carbuncle. Charcoal poultices were applied, the sloughs separated on the fourth day, and several hydatid cysts larger than grapes escaped. A drain was passed seven inches into the sac, which was daily washed out; in two weeks the cavity had become obliterated, and its opening was closed. The patient was discharged cured in two months.

RETROPERITONEAL HERNIA.

Manski,⁸⁴ in an excellent anatomical paper, calls attention to the fact that while so much is known about the external forms of hernia, the study of the internal forms has been much neglected. Treitz was the first to accurately describe these cases, which have since borne his name, reporting eight between 1847 and 1854. To conform to his definition the sac must be formed of peritoneum and be buried in true retroperitoneal connective tissue. This hernia may occur where the peritoneum forms a groove or furrow.

The most frequent and important locality is the fossa duodenjejunalis, which is situated in the left hypochondriac region posterior to the point where the duodenum enters the jejunum. It is bounded above by the pancreas, on the left by the kidney, and on the right by the aorta. Sixty-six cases of this variety have been reported. The second most frequent locality is in the region of the cæcum. Here there may be a variety of abnormal grooves. Twelve cases of this variety are reported. The third, the fossa intersigmoidea, is in the left iliac region; the hernia occurs between the layers of the mesocolon of the sigmoid flexure. This is the rarest form, only 3 cases having been reported. The symptoms of these internal forms of hernia are very rarely recognized, and only 1 case (Studenmayer's) was diagnosed during life.

Treves²²,_{July 6} observed a case of retroperitoneal fatty hernia in the femoral region. A small mass of fat, the size of a walnut, came down through the femoral canal,—not in a true sac of the peritoneum, but behind it. Removed. (This condition is not rare.) Cases were also reported by Clarke²,_{May 20} and Sonnenburg.³³⁶,_{July 20}

HERNIA OF VERMIFORM APPENDIX.

Brieger²²⁶,_{Sept.} has collected 41 cases of hernia of the vermiform appendix. In 20 cases the hernia was inguinal, in 15 femoral, and not stated in 6. In 23 cases the appendix was incarcerated, in 7 it was reducible, and in 11 not stated. In 8 cases the appendix was normal; operation was performed in 26 cases, 16 being entirely cured, 2 cured with faecal fistula following, 5 died, and in 3 the result was unknown. In the earlier cases the results were much less favorable than in the later. Brieger's conclusions are: (1) hernia of the vermiform appendix is more frequent than usually supposed; (2) it is impossible to make the diagnosis with certainty; (3) it may produce more or less severe complications; (4) it demands early operative interference; (5) resection of the appendix should, almost without exception, be performed.

During the past three years the editors have operated upon 6 cases of hernia of the appendix in children. In 2 cases the appendix was strangulated, in 3 irreducible, and in 1 reducible. One strangulated and 1 irreducible died. The strangulated was but 8 weeks old, and practically moribund at the time of operation.

Pollossen²¹¹ reports three cases of strangulated hernia of the appendix (ileo-cæcal). They occurred in persons aged 71, 37, and 32 years, respectively. Two of the patients were women, and in all of the cases the hernia was in the crural region and on the right side. The first case, aged 71 years, ended fatally, owing to perforation and gangrene of the appendix, previous to operation, which caused peritonitis. The other two cases recovered. Bruce Clark² showed, at the Clinical Society of London, a boy from whom he had excised the cæcum and vermiform appendix, with about two inches of large and two inches of small intestine, for irreducible congenital hernia. The testicle was so firmly adherent to the appendix that it was likewise removed. The operation had been done a year before, and there had been no relapse. End-to-end enterorrhaphy had been performed, with a double row of continuous sutures.

MISCELLANEOUS.

Schwab¹⁹ reports a case of ischiatic hernia, in a female aged 31, of four and a half years' duration and extending nearly to the knee. It was at first reducible, but later became irreducible. It measured sixty-two centimetres in circumference. It was diagnosed as a fibrolipoma, but operation showed the presence of a hernial sac, with small intestine within it. The mass removed weighed 7 pounds ($3\frac{1}{2}$ kilogrammes), and was composed chiefly of fibrous tissue. The wound healed badly and a urinary fistula followed. The author had collected seventeen cases from literature, and found that it occurred in women twice as frequently as in men. It was usually the size of the fist, and in four cases the ovary was found in the sac. The symptoms were so obscure that diagnosis was usually difficult.

Berger⁴¹⁹,⁵ describes a case of "encysted hernia" in a woman; doubtless a hydrocele of the canal of Nück, fourteen cases of which have been observed by Coley.²⁰⁶⁵ Rose observed a hernial protrusion in the left groin, composed of a diverticulum of the bladder adherent to an omental sac and communicating directly with the bladder. Wight,¹⁵⁷ in a case of inflamed hernia, found a "wood-sliver" two inches long, which had worked its way through the intestine and sac. Porter⁸¹⁴ reports a rare case of double ventral hernia, incarcerated.

DISEASES OF THE RECTUM AND ANUS.

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NEW YORK.

HÆMORRHOIDS.

H. Allingham, Jr.,⁶ in criticism of a very temperate communication from Smith, the author of the clamp and cautery operation for hæmorrhoids, stating what success he is having with that method of operating, wrote: "Mr. Henry Smith's article,⁶ on the above subject, might lead one to imagine that the operation by the clamp and cautery possessed every possible advantage. With all due deference to such an authority, I think it only right to recall to the minds of the readers of *The Lancet* the disadvantages of this mode of treatment. It is at least four times as fatal as any other method of removing hæmorrhoids. The pain is as great as, if not greater than, that proceeding from other methods; for one should be well aware that, in the rectum, as in other parts of the body, a burn is one of the most painful of all injuries; similarly contraction, another usual sequela of burning, is by no means absent after the clamp and cautery procedure. Again, secondary hæmorrhage is likely to occur on the separation of the sloughs caused by the burning. No doubt this operation may be suitable in selected cases, but to apply it to all cases of hæmorrhoids runs too near to the Procrustes bed method of procedure to deserve much commendation at this period of surgery. It has been my lot to operate on cases of hæmorrhoids in which the clamp and cautery have been used several years before. I treated them by crushing or by ligature, and was assured by the patients that the pain and after-trouble were far less than they had suffered after the burning operation. Tetanus, pyæmia, secondary hæmorrhage, and so forth, are almost unknown now, and in his reference to them Mr. Smith must be thinking of the era when the clamp and cautery were extensively used."

The second letter⁶ is from Burghard. He says: "Mr. H.

Allingham remarks, with regard to the operation for haemorrhoids by the clamp and cautery, that it is at least four times as fatal as any other method of removing haemorrhoids. This statement also occurs in the last edition of his work. During the last seven years I have seen many scores of cases of haemorrhoids operated upon in the manner condemned by Allingham, and in no single case has either death or any untoward symptom of any kind occurred. I would, therefore, venture to suggest to him that he should put before us both the figures and the source from which he obtained them, upon which he bases the statement that he has more than once publicly made. Until that course is adopted I, for one, cannot consent to look upon the fact as demonstrated. Further on in his letter he says, ‘ Secondary haemorrhage is likely to occur on the separation of the sloughs caused by the burning.’ This, of course, as it is put, is a mere matter of opinion. I would ask Mr. Allingham if he means to infer that, as a matter of fact, it does more frequently occur than when the ligature is used, and, if so, if he will quote his authority. I can hardly believe that he means this inference to be drawn, as he goes on to say that ‘ tetanus secondary haemorrhage are almost unknown now.’ Or does he mean that these terrible evils are the monopoly of the clamp and cautery? Indeed, it seems to me that the acrimony that has been imported into the debate on the relative merits of rival operations has somewhat obscured the pathological common-sense of the disputants. Where the difference is, from a pathological point of view, between clamping the base of a pile and crushing it I have never, I regret to say, been able to see. Similarly to declare that secondary haemorrhage is more likely to occur from the separation of superficial sloughs after burning than from the separation of a ligature around the base of a pile is, to me, an exercise in pathological hair-splitting of which my mind is incapable.

“And now, finally, for a few facts. During the past four years it has fallen to my lot to see from one hundred to one hundred and fifty of Mr. Henry Smith’s haemorrhoid cases, both during and after the operation. Apart from the fact that none of them had a single bad symptom of any kind, there were three points chiefly remarkable about them. Firstly, the extremely small amount of blood lost, so that in most cases the sheet upon which the patient was lying was scarcely even soiled; secondly, the trivial degree of

pain afterward, for I have seen nearly all of these patients the same evening as the operation, and in only a very small proportion was any opiate required after the patient was put back to bed, and even then it was given more with the object of confining the bowels than of relieving pain; thirdly, the short time during which treatment lasted. The great majority of the patients were up and about in ten days, and returned home on the fourteenth. Not half a dozen of the whole number required longer than this. As for the subsequent contraction and other ills alluded to, Mr. Henry Smith says that they are, nowadays, like the excessive pain, purely imaginary. I am by no means an admirer of the Procrustes bed method of treatment; at the same time, I am unwilling that a method of treatment that I am convinced is, in a very large number of cases, entirely admirable, should be so persistently decried by those who clearly have not taken pains to make themselves intimately acquainted with it, as witness Mr. H. Allingham's statement some weeks ago, that Mr. Smith cut off the pile and then applied the cautery, and Mr. Smith's assertion that he has abandoned that practice for years in favor of simply burning it off. I am as ready to be convinced as any one; but if the Messrs. Allingham can prove by the statistics of every case that has occurred to them,—say, during the past six years,—that as regards freedom from sepsis, pain, secondary hæmorrhage, subsequent contraction, and also as regards duration of treatment, the results obtained by the ligature or crushing machine are better than those obtained by the clamp and cautery, they will, at least, have converted me."

Were the editor inclined to add anything to this very fair challenge to produce facts instead of repeating opinions and fancies, he would simply call attention to the fact that the challenge has been again and again given to both the Allinghams, and always without other result than a repetition of the cry "death, hæmorrhage, pyæmia, pain, contraction!" Were it worth while, also, he would call the attention of the Allinghams to the results at the New York Post-Graduate Hospital, where the clamp and cautery operation has been for four years practiced exclusively, on no small number of patients. The results leave nothing to be desired. He would also offer to match those results against their own as to danger, pain, time of confinement in hospital, and subsequent contraction.

It might also induce the Allinghams to be a little more cautious in putting opinions instead of facts into print, if they knew that, whereas twenty years ago the ligature operation was practiced almost exclusively in America, and chiefly on the authority of Mr. Allingham, Sr., to-day the clamp and cautery operation has, in great measure, supplanted it both in hospital and private practice. Why? Because it is found to give equally good results with much less pain and much shorter confinement to bed and house.

Allingham, Jr., in one journal says that the clamp is six times as fatal as the ligature, and in another, in the same year, four times. If he can publish the cases, the profession can estimate the proportions for themselves.

In connection with the general subject of the best treatment for haemorrhoids, there are two notable things in the literature of the past year. The first is the entire absence of any reference to carbolic acid. Can it be that this method has finally disappeared from practice as well as from current literature? The second is the remarkable results of Whitehead's operation at Mount Sinai Hospital, New York.⁹⁶ "Three times in forty-seven cases we failed to get primary union. Either the stitches were put in with too much tension and cut through prematurely, or the wound being infected suppuration set in. In every one of these cases a circular cicatrix appeared, and was tending to the formation of stricture. In each case excision of the cicatrix and suture remedied the trouble. In one case, where too much of the outer integument had been removed, we had to deal with a condition more difficult to remedy. A not inconsiderable ectopy or eversion of the anal mucous membrane took place in this case, and gave rise to ulceration and haemorrhage."

The author refers to the fact that the editor has condemned this procedure on theoretical grounds, which is true. But never in any theories has he ventured to assert that 4 cases in 47 operations would require a second operation,—not to cure the haemorrhoids, but to cure the patient of the results of Whitehead's method.

Quénu⁹¹ has gone far, by his anatomical study of the pathology of haemorrhoids, to settle the question of their different varieties. Herbert Allingham, quoting from his father,²² says: "Arterial piles are more generally found in the young adult, and

are not, as far as can be made out, due to any portal congestion or other irregularities. They may be, and no doubt often are, hereditary. They are, in the majority of cases, smaller than the venous variety, and are reddish in hue. They do not, as a rule, prolapse so much as the venous kind, but they often bleed at stool, —sometimes very profusely. From the number of cases I have had the opportunity of watching at St. Mark's Hospital, I am of the opinion that in the treatment of this variety little or no good is to be gained by physic, an operation being the only method of permanently ridding the sufferer of the trouble."

This idea that piles may be divided into arterial, venous, and capillary, has been generally adopted on the authority of the elder Allingham, and I can claim no exemption. But from an anatomical and pathological stand-point it seems, as far as the arterial variety is concerned, not to have sufficient foundation in fact, and we expect in the future to see it abandoned. For some time it has been questioned by good observers, beginning with Cripps (see the ANNUAL for 1891), and now Quénu has dealt the finishing blow. He says: "The arteries have always appeared to us in very small number relatively to the abundance of the veins and veinules. . . . In general the arteries have been found absolutely normal both in calibre and structure. In a few cases they have shown some alterations. Once the walls were found thinned, the muscular fibres pale and discolored, the calibre slightly augmented. In another case in the same subject there was a peri-arteritis; that is to say, a propagation to the artery of the inflammation of the surrounding connective tissue. In one case, again, by the side of a normal arteriole there was a small artery affected with a slight thickening from endarteritis, with partial transformation into connective tissue of the two other coats."

Again he says: "As for the arterial variety, we have searched for it without finding it. We have felt, like Allingham, the pulsations which certain masses present to the fingers; we have seen the blood escape in jets from punctures made in the mucous membrane; but from this to concluding that these tumors consist of numerous arteries and veins freely anastomosing, tortuous, and sometimes dilated into pouches is a long way. In what manner has the English author recognized the arterial character of these dilated and pouched vessels? Has he injected them at the same

time as the veins; has he examined them under the microscope? That double examination would surely have been for him, as it has been for us, doubly negative. Moreover, the clinical signs have no need of the intervention of the arteries for a satisfactory interpretation; the exaggeration of the cavernous tissue and the hypertrophy of the capillaries are susceptible of communicating to the haemorrhoids the appearance and circulatory conditions of erectile tumors."

Again, "Consequently, when there is seen, in certain cases of haemorrhoids, the red color of the mucous membrane in some spots, the pulsations, the rhythmic jet of blood, all this signifies but one thing, and that is, that at these points the circulation is more easy and therefore more rapid through the enlarged capillaries; it is even possible that part of the alterations are consecutive to the changes in the local circulation, such as the hypertrophy of the muscular coat of the veins. Some haemorrhoidal veins undergo a sort of arterialization while the arterial walls remain normal or tend to atrophy."

While thus denying the pathological fact of the existence of anything that can properly be called an arterial haemorrhoid, the author maintains, from his microscopical examinations, that the distinction between venous and capillary is also anatomically incorrect. He says: "Every variety of haemorrhoid consists of alterations of the veins and capillaries; the capillary haemorrhoids of Allingham are nothing else than those in which the process predominates in the mucous membrane or those in which it has begun in it. It is true that the surface of these productions is granular, analogous to that of a strawberry, bright red, bleeding on the slightest contact, leading easily to that form of ulceration which we have described as erosive; but, on the one hand, the capillaries are not alone involved, the veins are equally changed, and, on the other hand, the capillary hypertrophies and the cavernous formations are met in all the varieties called venous haemorrhoids."

SYPHILITIC STRICTURE, SO CALLED.

We strongly recommend a careful study of the following interesting points by Duplay ³_{v.12, p. 461; J. June 14}, ²² to all students of diseases of the rectum. The case under discussion was that of a patient suffering from a non-malignant stricture of the rectum. Duplay

wrote: "The form of contraction which we are studying is met with often enough in patients obviously the subjects of constitutional syphilis, and the majority of authors admit, without hesitation, that the rectal lesion is of a syphilitic nature; but there is a wide divergence of opinion when it becomes a question of explaining the processes by which syphilis induces stricture of the rectum. Among the theories which have been emitted upon this subject, the most plausible is the one of which Fournier is the author, and which may be termed the theory of 'ano-rectal syphiloma.' According to this theory, the lesions which occur in the rectum are comparable to those which tertiary syphilis causes in the tongue, and which end in sclerosis of the organ. The ano-rectal syphiloma consists in the infiltration of the walls of the rectum by a kind of neoplasm analogous to gummatous growths, which, in its evolutionary changes, leads finally to a sclerosis of the affected tissues, and subsequently to contraction of the calibre of the rectum. This most ingenious theory has been accepted by the majority of pathologists, and I myself have admitted it and taught it in my writings and clinical lectures.

"Since, however, my observation of these strictures of the rectum have been more carefully carried out, I have been led to doubt its accuracy, and at the present time I think I may say that it is very often in contradiction with the results of clinical observation, and that in all probability we shall have to reject the ano-rectal syphiloma theory as not being an exact expression of the truth. First, it is a fact that, among the patients who present the symptoms of so-called syphilitic stricture of the rectum, there are a great number in whom it is impossible to discover the existence of syphilis. This is the case in the patient before us, in whom we have been quite unable to find anything which would give countenance to the view that she is syphilitic.

"On the other hand, one meets in practice with certain strictures of the rectum which present the same physical characters as syphilitic stricture, but which have obviously a very different cause, viz., dysentery. Further, there is a fact to which the majority of authors are witnesses, and which speaks against the syphilitic nature of the stricture, viz., that antisyphilitic treatment, which in every other instance succeeds so well, remains absolutely powerless against the so-called ano-rectal syphiloma. It has been

alleged, in explanation of this fact, that, when lesions in organs have reached the stage of sclerosis, antisyphilitic treatment cannot be expected to bring about any alteration. But it is very strange that patients always consult their physicians in the last stage of the disease, and one can hardly bring oneself to believe that patients would not, from time to time, be met with in the initial stage of ano-rectal syphiloma, and in whom, consequently, syphilitic treatment ought to succeed ; but, I repeat, in so-called syphilitic stricture of the rectum this treatment is always useless.

“ It is in consequence of the above observations that I have been led gradually to reject the theory of ano-rectal syphiloma and to have my doubts about the syphilitic nature of the rectal strictures that one now and then meets with in patients who are the subjects of constitutional syphilis. What is, then, the nature —what are, then, the causes—of these strictures ?

“ In my opinion, these strictures are absolutely comparable in their nature to those met with in the other natural channels of the body, such as the urethra and the œsophagus. These inflammatory strictures have many causes. To attach no importance to chronic constipation, to chronic diarrhoea, to the abuse of purgatives, all of which have the credit of producing stricture, one ought especially to note the various inflammations of the rectum, whatever their cause or nature. I have already mentioned dysentery, but one must add rectitis consequent upon haemorrhoids, that consequent upon purulent rectal catarrh, resulting not infrequently, especially in women, from unnatural sexual connection ; but, over and above these, inflammation of the rectum may be caused by contamination through infective vaginal discharges.

“ If I have thrown doubt upon the syphilitic nature of rectal stricture, I will freely admit, with Gosselin, that syphilis plays an important rôle in the development of the process, since it causes a chronic infiltration of the rectal walls as a result, for instance, of chancres and, more often, of mucous tubercles of the anus and rectum.

“ To recapitulate, without rejecting entirely the theory of ano-rectal syphiloma, I am inclined to the belief that the so-called typical syphilitic stricture does not exist, and that, leaving out the question of congenital, traumatic, and cancerous strictures, the remaining rectal strictures are all of an inflammatory nature, and

are the effects of an acute or chronic infiltration of the rectal walls, which latter is dependent upon many causes. If syphilis can be regarded at all as a cause of rectal stricture, its action is only indirect, in that it merely causes an inflammation of the rectum. Further, the greater frequency of rectal stricture in women, as compared with men, is explained, in my opinion, by the fact that in the former the possible causes of rectal inflammation followed by infiltration are more numerous and act to better advantage."

While the editor would not have it understood that he agrees entirely with Duplay, he believes the ideas advanced to be, in the main, correct. In his opinion there are two distinct classes of syphilitic stricture, the one due to gummy deposit and the other to healing of tertiary syphilitic ulceration, but both are extremely rare; so rare that the majority of observers have never seen a clear case of either.

CANCER AND EXCISION.

Gersung³³⁶ has tried an ingenious method of obtaining better control after extirpation of the sphincters. It consists simply in twisting the gut on its long axis until, when the finger is introduced into it, it meets with considerable resistance, and stitching the gut into the wound in this twisted condition. In two cases in which this was done the effect was good. One patient had no trouble at all with regard to the discharge of faecal matter; and the other, though unable for a time to retain fluid stools, ultimately became quite free from incontinence. On digital examination, some time after the operation, the rectum in each case was found to be closed near its lower end by an elastic annular constriction. The method certainly seems worthy of a thorough trial.

Willem³³⁶s has been experimenting on the same line, but only on the cadaver. After removal of the lower part of the rectum, together with the sphincter, by the perineal operation, the body, if it has hitherto rested on one side, is placed in the lithotomy position. If the rectum has not been divided very far above the anus, and its remaining portion can be readily drawn downward, a skin incision about two inches in length is made over the ischial tuberosity in an oblique direction, upward and outward, so as to run parallel to the fibres of the gluteus maximus. A slit is then

formed in this muscle, about a finger's breadth above its lower margin, by separating its bundles by means of a director or closed dissecting forceps. The extremity of the gut is finally drawn through this opening and stitched to the skin. When a considerable portion of the rectum has been removed, and it is found impossible to drag down the gut-margin as far as the ischial tuberosity, the author would endeavor to insert the end of the gut at a higher part of the gluteus muscle, and between the muscular bundles which arise from the margin of the sacrum. In such case the incision through the skin and fascia should be carried obliquely downward and outward from the right margin of the sacrum.

Lövinsohn⁷⁸¹ gives a statistical study of the cases of cancer of the rectum operated upon at Czerny's clinic during thirteen years. One hundred and nine cases were subjected to radical operation. Ten cases died from the operation. Of the remainder, 21 per cent. lived two years, 15 per cent. three years, 13 per cent. four years, and 8 per cent. five years, while 4 others are living more than six, eight, eleven, and thirteen years after operation. Forty patients, or 40 per cent. of those recovering, have survived the usual three-year limit. Thirty-six cases were subjected to the sacral operation, the rest to the old perineal method. These results are truly remarkable, and, could they become general, would put an entirely different aspect upon the radical operation.

Treves⁶,¹¹ reports a case of excision of a cancer of the sigmoid flexure "in order to show that simple measures in uniting bowel may possibly be attended by success, and that the older method of operating, so severely condemned by the advocates of the newest gut-plate or bobbin, is not of necessity followed by the death of the patient." The case was one of cylindrical epithelioma involving the colon for one inch and a half of its extent, and the not unusual complication existed of a greatly distended gut above the disease and a greatly contracted gut below. Seven inches of sigmoid flexure were cut away with scissors, and a triangular piece of the mesentery also excised. The gap in the mesentery was closed with two sutures of silk. The next step was to partially close the divided end of the greatly distended upper segment until the part left patent would correspond to the lumen of the collapsed bowel below. This was done by means of a continuous suture of the mucous membrane, followed by an outer line of Lembert's

suture. For each suture No. 1 silk braid was employed, a milliner's needle being used for the continuous suture and a small, round, Hagedorn needle for the interrupted stitches. This upper segment of the bowel was as rigid as if made of leather.

The two ends of the gut were then joined together in the same way, *i.e.*, by a continuous suture of the mucous membrane and an outer line of Lembert's suture. About fifty sutures were employed, and it was apparent, on allowing the contents of the bowel to pass through, that the suture line was water-tight. The operation occupied one hour and a quarter. The patient made a good recovery without a bad symptom. This simple method of operating has gained in popularity ever since the first flush of success with apposition plates and anastomosis, and especially since the danger of contraction of the anastomotic opening began to be appreciated.

Rydygier,¹¹² after a review of the evils likely to result from a large gap in the sacrum, as is made by the Kraske operation, describes another method for resection of that bone. The skin incision, which begins just behind the posterior superior spine of the ilium, on the left side, is carried obliquely downward along the left of the sacrum and about half an inch to the outer margin of that bone, so that this margin is covered by skin even after retraction of the edges of the wound. The incision is carried downward in the middle line from the tip of the coccyx as far as may be found necessary. The left margin of the sacrum is now exposed at the bottom of the upper margin of the wound, and the left posterior sacro-sciatic and sacro-iliac ligaments divided. The soft parts are detached from the anterior surface of the bone and pushed forward, care being taken not to sever the anterior sacral nerves. A transverse incision of the skin is now made from left to right, just below the third sacral foramen and about two inches from the junction of the sacrum and the coccyx, and the sacrum divided with chisel and hammer. The large triangular flap, made up partly of the detached fragments of the sacrum and the sub-adjacent skin and soft parts, can now be readily elevated toward the right side. After removal of the diseased portion of the rectum, the cavity is loosely plugged with iodoform gauze and the flap of bone and skin replaced. There is no necessity, the author states, to fix the fragments of bone by sutures. The lower part of the

wound is left open to facilitate drainage and the application of new dressings. Necrosis of the partially detached piece of bone is not likely to occur. No important nerves or large arteries need to be divided.

COLOTOMY.

Chaput ³⁸⁰_{v.2, p.42, 72; p.6} ¹¹² describes a new operative procedure in colotomy. The usual incision is made under cocaine instead of general anaesthesia. The intestine is fixed on each side of the wound by means of pressure-forceps. Each pair of forceps is so fixed as to hold in apposition the intestinal wall, peritoneum, and the muscle in the lateral part of the wound. Eight pairs of forceps are applied, left on for twenty-four hours, and removed. The parts are washed with antiseptic solution, covered with an antiseptic pad and fixed with a bandage.

As long as the pressure-forceps are strong enough to take the place of silk sutures and close the abdominal wound sufficiently to prevent evisceration by escape of the small intestine, they may be of advantage in shortening the time of operation ; the editor believes, however, that the omission of the wire suture through the abdominal wall and under the gut is a serious one. The operation of colotomy is not as simple as at first sight it might appear, and no precautions should be omitted. The gut has more than once torn away from the wound and fallen back into the abdomen, to the great danger of the patient. More than once, also, evisceration has occurred, the small intestine escaping by the side of the large a day or so after the operation, and in one of my cases this accident ended fatally from shock.

STRICTURE AT ANUS.

Krouse ⁵⁹_{v.2, p.22, 23} has reported a very successful case of Dieffenbach's operation of proctoplasty for stricture of the anus. The patient, a child of four years, was placed in a hot sitz-bath for retention of urine, and left there till the whole perineum, anal region, and adjacent buttocks were blistered. Sloughing followed, leaving an ulcerated surface that required over two years and a half to granulate and cicatrize. The anus was contracted to the size of a No. 25 bougie of the French scale, was undilatable, and a large faecal impaction occupied the rectum.

The contracted orifice was split anteriorly and posteriorly. The

anterior incision extended through the cicatrix into the healthy submucous tissue; the posterior cut was carried backward into the dense cicatricial tissue to the extent of about half an inch. A tongue-shaped flap of skin, about an inch and a half in length by three-quarters of an inch in width, was then dissected from the scrotum and perineum and slid back into the anterior incision, and attached to it and to the gut by numerous silk sutures. Into the posterior cut another flap was sewed, but this flap did not come from the immediate vicinity, but was dissected from the healthy tissue of the left buttock outside of the scar, and had to be twisted before being sutured to the cut.

The stitches were removed on the eighth day, and it was then found that the anterior flap had united nicely, while the posterior one had died; no doubt its death was due to poor blood-supply of the dense cicatricial tissue to which it had been sutured. The operation was, however, successful in accomplishing what was desired,—the relief of the stricture of the anus.

FISTULA.

Coltman, corresponding editor at Pekin, China,⁶⁷³ App. says that fistula in ano is very prevalent in Pekin, due, he believes, to the particular kind of rice upon which the natives largely subsist, and which they prefer underdone. He has operated on five cases within a month, all of whom had been living almost exclusively upon this hard, partly-cooked rice.

MISCELLANEOUS.

In the report of the third year's work in diseases of the rectum at the New York Post-Graduate Hospital,¹ Feb. 18 several cases of interest are noted, amongst others two bad accidents after colotomy, both due to an attempt to simplify the operation by the omission of part of the sutures uniting the gut to the cutaneous incision. In one the accident was discovered very early, and the gut was replaced and the colon opened and stitched firmly into the wound at the same time. This one recovered. In the other the accident was not discovered till the patient was in collapse, and when the dressing was finally removed by the dresser nearly all of the small bowel had escaped and had become firmly agglutinated coil to coil, and the whole mass to the gauze which covered it. Over an hour was spent

in separating the coils from the dressings and returning them to the abdomen. Death from shock followed in a few hours. Both of these cases were marked by the same sign,—a profuse gush of abdominal fluid sufficient to soak through all the dressings and into the bed at the time of the accident. In general there is not sufficient discharge from the wound to soil the dressings, and in any case of profuse escape of serum the wound should be examined.

In another case, an extirpation of a non-malignant stricture was abandoned in favor of a colotomy, on account, first, of the great extent of the disease, and, second, because of the immense dilatation of the gut above the constriction. The disease was of long standing, and the sigmoid flexure filled the entire pelvis, and was fully as large as a child's head.

SURGICAL DISEASES OF THE GENITO-URINARY APPARATUS IN THE MALE.

By E. L KEYES, M.D.,

AND

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NEW YORK.

GENERAL LITERATURE.

Henry Morris, of London,⁶, in the Cavendish lecture on "Some Changes in Surgical Opinion Regarding the Diseases of the Urinary Organs," after referring to the causes for these changes, which he states to be anæsthetics, antiseptics, recent anatomical and pathological investigations, changes in fashion and surgical ingenuity, enumerates some of the most striking of them. Among these, as regards the kidney, are the present views concerning floating or movable kidneys, such a condition of affairs a few years ago being held, by good authority, to be a myth; nephrotomy in cases of mechanical or reflex anuria; and the thorough incision into the kidney, laying open the pelvis and thus permitting digital exploration in making a search for stone. In considering anuria, Morris records a successful case where, having performed, in 1889, left-sided nephrectomy, he was obliged, in 1892, owing to intermittent hydronephrosis of the remaining kidney, to perform nephrotomy and to stitch the edges of the kidney to the lumbar wound to secure drainage. With reference to vesical affections, mention is made of litholapaxy, invented by Bigelow, aided by anæsthesia, Otis's urethrometer, and Clover's exhausting syringe; the adaptation of this operation to the cases of small boys, based on the Indian statistics of Keegan, Freyer, and others; Thompson's digital exploration of the bladder; the supra-pubic operation re-introduced by the researches of Garson and Petersen, and the success attending treatment of intra-peritoneal vesical rupture. Urethral surgery, including rupture of the urethra, is also touched upon.

Vigneron, of Marseilles,¹⁰⁰ has considered genito-urinary tuberculosis, from a surgical point of view, in a very thorough manner. The introductory portion of the article is historical in character, after which the disease, as it occurs in connection with the various parts of the system, is considered with reference to its pathology, symptoms, treatment, etc. The chief literature on the subject is also reviewed. Reference will be made to this article later on, in connection with the kidney.

Bacteriology.—Much important work has been and is being done in this department. Hallé and Dissard²⁶⁸ state that the bacterium coli communis has been variously named by different observers bacillary bacterium, septic bacterium, pyogenic bacterium, coccobacillus ureæ pyogenes, and urobacillus nonliquefaciens septicus. Almost simultaneously Morelle, Krögius, Achard and Renault, and Rodet discovered that this bacillus was none other than the bacterium coli communis of Escherich. There has been quite a controversy as to whether the bacterium coli communis in the urine is capable of decomposing urea, thus rendering an acid urine alkaline. Among investigators, Bouchard, Albaran and Hallé, Krögius, and Reblaud are of the opinion that this bacillus can decompose urea and cause the change; while Morelle, Miquel, Achard and Renault, and Barlow hold the opposite view. In the present article Hallé and Dissard, by careful experiments, seem to settle the question definitely, that this germ can and does decompose urea and cause an alkaline change. This change, however, is always slow, and the urea can never be more than very partially decomposed. Urines infected by this germ alone are acid when passed, often, however, but feebly so, and may remain acid for a long time afterward (*i.e.*, days or even weeks), especially if the acidity is marked at first. Such urines on standing are apt to appear quite clear, the sediment settling compactly at the bottom.

Hallé,²⁶⁸ in criticising the thesis of Jules Renault on the bacterium coli communis in urinary infections, calls attention to the fact that the author in his references has failed to allude to the investigations of the Necker school or to the valuable work of Krögius, of Helsingfors. This article is worthy of note, owing to the references to the literature of the subject which are given. Jean-selme²⁶³ records a case of acute hæmorrhagic nephritis caused by

this bacillus, the author surmising that most cases of acute ascending nephritis are caused by it. Julius Schnitzler, of Vienna,⁵⁷ records a case of pyonephrosis in which the presence of the bacillus was demonstrated.

Emile Reymond, of Paris,²⁶⁸ in a valuable article, demonstrates, by clinical observation and by experiments on animals, the fact that the bladder can become infected by microbes which penetrate its walls from neighboring pelvic inflammatory foci, such as often exist in cases of puerperal metritis and phlegmonous inflammations in connection with the broad ligament, rectum, and pelvic organs generally. The author notes numerous clinical instances taken from the services of Terrier and Guyon, in many of which a cure of the pelvic inflammation was followed by a speedy cure of the cystitis. In several of these cases inflammation of the womb and of the bladder co-existed; the same bacillus was found in each cavity. In the experiments dogs and rabbits were used. In order to render the bladder receptive to germs (see ANNUAL of 1893) a ligature was tied around the penis, and a culture containing the urobacillus liquefaciens of Krögius was injected, in some instances just under the peritoneum covering the bladder, and in others into the pelvic peritoneal cavity. At the end of ten hours the urobacillus was found in the urine, which had been examined before the experiments and found to be sterile. The article by Hallé on pericystitis, which will be considered farther on, shows that inflammatory agents can penetrate from the bladder into the perivesical tissues. It is seen, therefore, that under favorable conditions germs can traverse the bladder-walls in either direction.

Von Fritsch³³⁶ records a case of erysipelas of the bladder. The individual in question had had for some time suppurative prostatitis. Suddenly he was seized with chills and fever and great tenesmus. In the purulent urine the streptococcus of Felheisen was found. During the course of the vesical attack the erysipelatous eruption appeared on the thigh.

J. Schnitzler, of Vienna,³³⁸ in considering the etiology of cystitis, has made researches in 25 cases. In 24 of these the urine was ammoniacal on emission, or became so immediately afterward. In 1 case the purulent urine was acid. In 15 cases there existed but one kind of bacterium; in 10, two or more. In 23 cases the bacilli found had the power to decompose urea.

Krögus and Chydenius⁴⁹⁸ have made over five hundred experiments to test the antiseptic value of corrosive sublimate, biniodide of mercury, nitrate of silver, boracic acid, and permanganate of potash. In pure cultures of the bacterium coli communis, proteus vulgaris (*urobacillus liquefac. septic.*), staphylococcus pyogenes aureus, and streptococcus pyogenes, silk threads were placed. These threads were then transferred to different antiseptic solutions for varying intervals, after which they were put into flasks of sterilized urine in order to see if cultures could be produced. From these experiments it was proved that the staphylococcus almost completely resisted the action of the mercury solutions. The biniodide were found to be much weaker than the bichloride solutions. The bacillus coli communis resisted the nitrate-of-silver solutions most, the streptococcus least. Boracic acid and permanganate-of-potash solutions exerted little influence on these organisms. It was shown that instruments were best disinfected if placed in a 1-to-500 solution of nitrate of silver, alcohol and ether being employed to remove fatty substances. G. Frank Lydston, of Chicago,⁴⁵¹ reviews modern bacteriological researches in their relation to the surgery of the genito-urinary organs.

The Orchiococcus.—Hugounenq and Eraud, of Lyons,¹⁴ Mar. 5, Apr. 12 have discovered a new micro-organism in gonorrhœal discharges, which they consider to be the specific microbe of gonorrhœal epididymitis. They have named it the orchiococcus. It is a diplococcus of much the same shape as Neisser's gonococcus, although slightly larger. It is discolored by Gram's method similarly to the gonococcus, from which it is distinguishable in the following particulars: It is easily cultivated in peptone, peptonized gelatin, bouillon, and alkaline solutions of casein and nuclein, maintaining in these different media the faculty of reproduction and its own integrity of form for over a year. It is often found in the first few days of a gonorrhœal discharge. If, therefore, in a given case of gonorrhœa, a drop of the discharge sown on gelatin fail to produce a culture, the orchiococcus is not present, and consequently epididymitis is not to be feared. If, however, the contrary condition exist, and a culture is produced, then epididymitis is to be expected. The orchiococcus exercises no action on the conjunctiva, the peritoneum, or the urethra. A culture, however, introduced into the testicle of a dog, produced an epididymitis.

Menge⁸¹⁷ has succeeded in cultivating the gonococcus in a mixture of agaric (*mélange d'agar*) and in the liquid taken from serous cysts. Heretofore the only successful cultures have been in blood-serum, as advocated by Wertheim. Chas. Audry,⁸⁶³ in studying micro-organisms in gonorrhœal discharges, concludes that, in cases where the disease is accompanied by complications, other micro-organisms are associated with the gonococcus,—and it is to these that the author ascribes the complications. He does not attach much importance to the decolorizing method of Gram, since many other bacilli besides the gonococcus are discolored by it.

A. Hogge, of Liége,²⁶⁶ after reviewing the literature and citing some personal observations, concludes that it is easy to demonstrate the gonococcus in acute cases, but that in chronic ones it is often very difficult. In these latter cases, in order to make a definite diagnosis, a trial should be made (1) of the decolorizing method of Gram; (2) of therapeutic agents, such as solutions of nitrate of silver and of corrosive sublimate, which agents destroy gonococci in acute cases and also the cocci which cause simple urethritis, but which do not oftentimes penetrate sufficiently into the tissues to reach the gonococcus in chronic cases; and (3) of cultures.

F. P. Guiard, of Paris,²⁴ in an interesting article, "Is there Such a Thing as Gouty Urethritis?" records the case of a man who suddenly showed an abundant discharge fully two months after intercourse. As he was gouty, the discharge was at first thought to be due to that diathesis. Examination, however, showed an abundance of gonococci. The author, therefore, argues that the period of incubation of gonorrhœa may be much longer than is commonly supposed. In the discussion which followed the reading of this article Jamin stated that he had observed cases in which as many as twenty days had elapsed after the suspicious intercourse before the discharge appeared. He considered that these cases of retarded urethritis were liable to run a milder course than those asserting themselves promptly.

The same author²⁴, discusses the importance of bacteriological examinations in the clinical study of urethral discharges. After recording a number of cases where men marrying with very slight chronic discharges infected their wives with gonorrhœa during the honeymoon period, the author urges that the surgeon should be most careful in considering marriage in such cases, and

should not permit it until the absence of danger be determined by bacteriological study. Guiard, following in the track of Wertheim, maintains that in chronic discharges a false gonococcus often takes the place of the regular gonococcus of Neisser, and that in these old discharges the culture of the gonococcus degenerates into these false gonococci. In a number of instances scrapings of the urethra were examined after a course of treatment with permanganate-of-potash solutions had stopped all discharge, and nothing but diplococci were found. Treatment was then suspended. Eight or ten days afterward, however, a discharge re-appearing owing to the too-early suspension of treatment, there having been in the meantime no fresh exposure, numerous gonococci were found as a result of fresh examinations. The author describes these false gonococci as diplococci which resemble the gonococcus in form, but which are always found isolated and not in the interior of pus-corpuscles. Jullien, of Paris,²⁴ also considers the question of the contagiousness of chronic discharges and their relation to marriage, concluding that it is often difficult to make a decision when certain diplococci are found which resemble gonococci somewhat, but which do not have all the characteristics. In such a case the decolorizing method of Gram is tried and gelatin cultures are attempted. If the cultures fail, the author believes that the diplococci are gonococci; if they thrive and multiply, he considers that they are not allied to the gonococcus, and that the discharge is innocuous. This rule of Jullien's, however, regarding cultures would not hold good in a case where diplococci representing degenerated gonococci and innocuous forms of bacteria co-existed. In such an instance wrong conclusions would be drawn.

Tuffier,¹⁴ in an article on chronic urethritis and its consequences, relates a number of cases where chronic discharges proved to be contagious, and touches on the question of bacteriology. Brose, of Berlin,⁶⁹ holds very extreme views on the subject of the contagiousness of chronic discharges. This author considers that no one is a fit subject to marry who has any sign of a discharge, or even a shred in the urine, no matter what the result of the bacteriological researches may be. Such extreme views cannot be enforced, and are therefore not to be encouraged.

Stern³⁴ has found the gonococcus in the knee-joint in a case of acute gonorrhœal rheumatism. Horwitz, of Vienna,⁸ has

demonstrated its presence in an abscess of the hand, occurring in an individual suffering from gonorrhœa. The author reviews extensively the question of the metastatic action of the gonococcus.

Jules Janet²⁰⁶ discusses, in an interesting article, the receptivity of the urethra and uterus to germ infection, in instances where these organs have for a long time previously been subjected to the influence of chronic inflammatory changes. As Finger has already stated, in these chronic conditions, the natural cylindrical epithelium

Model A.

Model B.

CATHETER PRESERVING AND STERILIZING APPARATUS. (KUTNER.)
Annales des maladies des organes génito-urinaires.

of the urethra is replaced largely by pavement epithelium, which offers little resistance to the penetration of germs into the canal. Numerous cases illustrating this state of affairs are given, and the author concludes that such individuals are often infected not only by women who are innocuous to any one with a healthy urethra, but also by contact with clothing, and occasionally even by germs contained in the air. For such individuals, in order to keep com-

fortable, Janet advocates irrigation of the urethra with a mild anti-septic, such as permanganate of potash, after every intercourse, or the use of the condom. Bordas and Wickham,²⁶⁶ as a result of considerable bacteriological investigation, conclude that in cases where the urine is sterile the "*sonde à demeure*" can best be omitted after internal urethrotomy. (In America, where the "*sonde à demeure*" is rarely employed after any case of internal urethrotomy, this article would not attract as much attention as in France. An attempt is also always made at present to render the urine sterile before any genito-urinary operation.)

Methods of Preserving and Sterilizing Catheters.—Robert Kutner, of Berlin,²⁶⁶ has invented quite a simple apparatus whereby soft catheters, especially silk-woven ones, which cannot well be boiled without injury, can be sterilized by steam. The steam, as seen by the figure (Model A), passes in at the end of the catheter, *d*, and emerges at the eye, *e*. It then comes in contact with the outside of the catheter, after which it makes its exit at the vent, *g*. Model B shows how this arrangement can be made to sterilize a number of catheters at once. (See preceding page.)

Boulanger, of Paris,²⁶⁶ has perfected the arrangement employed by Guyon at the Necker Hospital, whereby catheters are sterilized by sulphurous acid so that there is no escape of the fumes of the acid on removing the instruments, thus making the process of more practical value.

Gouley, of New York,¹, writes some notes on American catheters and bougies. After giving a history of the manufacture of these instruments, the author calls attention to the magnitude of the industry in America, which, although of recent date, is, nevertheless, capable of producing instruments of very fine quality. Rules for the preservation and cleansing of catheters are given, and a saponic mixture of Castile soap, 360 grains (23 grammes); tinct. quillaia, $\frac{1}{2}$ ounce (16 grammes); water, sufficient to produce 1420 grains (93 grammes), is recommended; fats, glycerin, and vaselin being discarded as injurious to the instruments. Cabot, of Boston,¹, referring to Gouley's article, states that he has found by experiment that castor-oil does not injure catheters as other fats do, and recommends it to patients where economy is an object. John M. Kitchen, of Indianapolis,¹, confirms Cabot's views and states that he has used castor-oil in this capacity for seven years.

DISEASES OF THE PENIS.

J. Englisch, of Vienna,¹⁰²⁶,_{v.8,p.37,19} reports two cases of congenital penile fistula, analogous to those published by Marchal, Verneuil, Piraudat, Luschka, Pribram, and Perkowsky. In each case the orifice of the canal was on the dorsum of the penis, somewhat behind the glans, and from this orifice the direction of the fistula was backward, occupying the space between the corpora cavernosa and finally ending in a *cul-de-sac* in the neighborhood of the pubis.

Herbert W. Page, of England,⁶,_{july,8} and F. J. Shepherd, of Montreal, both report cases of traumatic penile fistulæ occurring in children. In Shepherd's case the traumatism causing the fistula was so extensive that it interfered with the distal circulation of the organ, an elephantiasis resulting. In Page's case perineal drainage accompanied by a plastic operation resulted in a cure. Schüller, of Berlin,⁴,_{n.s.4,19} reports a case where, by a plastic procedure, he cured two co-existing penile fistulæ without having recourse to perineal drainage.

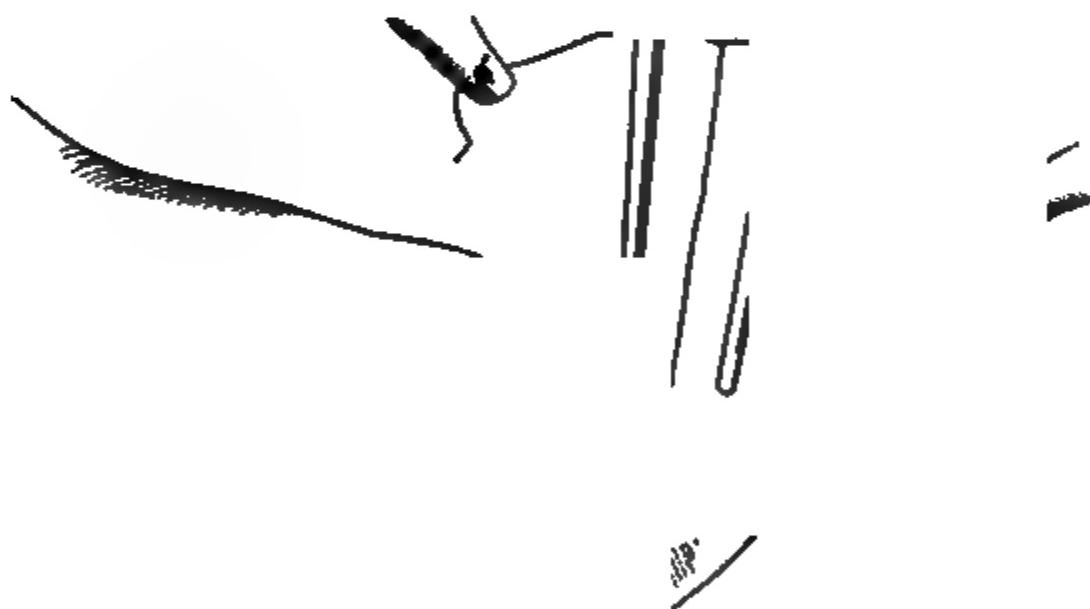
Körte, of Berlin,³³⁶,_{july 20, 2003} relates a curious case of gangrene involving the entire sheath of the penis, together with both corpora cavernosa, the corpus spongiosum and a portion of the glans only remaining. The gangrenous process started from an apparently simple paraphimosis. After resolution commenced a wide bridge-flap was formed from the scrotum, through which the penis was passed, the glans protruding. After ten days the edges of this flap were cut and brought together underneath, thus forming a new sheath. The plastic operation was successful, though, of course, the erectile power was permanently lost.

C. Devrient, of St. Petersburg,²¹,_{n.22,19} also reports a case of partial gangrene of the penis, some of the sheath only being involved. Very severe influenza was the apparent cause in this instance. Balzer and Souplet,¹⁴,_{apr.16} record two cases of suppuration extending along and under the median raphé of the penis and scrotum, thus forming canal-like tracks of pus.

Arbuthnot Lane, of London,²,_{Dec.24,19} records a case of destructive papillary growth of the penis, which apparently started from the urethra much as a phagedenic ulcer. Fine papillary outgrowths, however, studded the entire surface of this ulcer and finally penetrated the walls of the organ. The nature of the growth is not stated. (It is, however, probably cancerous. We have in our

possession a similar specimen which is cancerous.) K. Touton, of Wiesbaden,⁸¹ reports a case of gonorrhœal involvement of the sebaceous glands of the penis. Histological and microscopic examinations were made, which demonstrated the presence of the gonococcus. Gonorrhœal inflammation in these glands was shown to produce a proliferation and a transformation of their lining epithelium.

Rosenbaum, of Berlin,⁸² reports a case of epispadias which he cured by means of a series of plastic operations.



BILATERAL RESECTION OF SCROTUM. (BONNET.)

Technique of the operation.

Archives de Médecine et de Pharmacie Militaires.

Poucet,⁸³ reported to the French Congress for the Study of Tuberculosis an article on tuberculosis having its origin in the penis. Three varieties are mentioned: (1) balano-preputial tuberculosis, (2) tuberculosis of the mucous membrane (this variety usually showing itself first in the deep urethra), and (3) a tuberculosis of the urethra which consists of fungous masses involving

the peri-urethral tissues, thereby allowing the urine to infiltrate the penile structures.

SCROTUM, TESTICLE, EPIDIDYMIS, AND CORD.

L. Bonnet²⁴⁸ advocates, for the cure of varicocele, a bilateral resection of the scrotum, thereby forming a natural suspensory. The accompanying cuts give a good idea of this operation. Personally, we do not favor resection operations, since, in our experience, the scrotum, no matter how redundant it may seem to be while the varicocele exists, soon retracts nearly to normal proportions after the varicocele has been cured by ligation, preference being given to the subcutaneous method.

W. Hoffmann¹⁸ reports a very interesting case where suppuration took place in the loose connective tissue enveloping the scrotal portion of the spermatic cord. Bauby, of Toulouse,¹⁰⁶⁸ reports a case where, following an exertion, an haemorrhage took place into this same part. In each of these cases, in making a diagnosis, an inguinal hernia had to be considered. There was, however, no impulse on coughing, and no enlargement of the external ring could be detected. In Bauby's case the testicle could be easily felt, showing that there was no distension of the sac of the tunica vaginalis. In these cases a definite diagnosis was arrived at by making an incision into the tumor.

Brault, of Lyons,²¹¹ under the title of false orchitis, reports a case of deep simple phlegmon of the scrotum, which developed during the course of an intermittent fever. This case is probably similar to the one reported by Hoffmann.

Reginald Harrison, of London,¹⁰⁷⁷ reports a case of violent neuralgia of the testicle unaccompanied by varicocele, in which

BILATERAL RESECTION OF SCROTUM. (BONNET.)

Appearance immediately after the operation.

Archives de Médecine et de Pharmacie Militaires.

he accomplished a cure by cutting down on to the cord and dividing the associated nerves. From the success in this case, Harrison is inclined to think that, in many cases of painful varicocele which are relieved by operation, the relief experienced is due to the division or ligation of the nerves, rather than to the obliteration of the varicocele. Paul Reclus²⁰⁶ reports in full his case of dermoid cyst of the scrotum, reference to which was made in the ANNUAL of 1893. Henry E. Clark, of Glasgow,²¹³ also reports a dermoid cyst of the testicle. (Such tumors are rare.)

P. Diday, of Paris,²¹¹ presents a useful form of suspensory

COMPRESSION BANDAGE FOR SCROTUM. (WICKHAM.)
La France Médicale.

bandage. The bag which holds the scrotum is so attached to a well-fitting waist-band that both anterior and posterior tractions are exerted to hold up the parts. To accomplish this two anterior and two posterior straps, both equally strong, are attached to the bag, which thus hangs suspended, much like a hammock. The lengths of these front and back straps can be regulated to suit requirements.

E. Wickham, of Paris, ¹⁵² advocates, for cases which require not only scrotal support, but also compression, a bandage such as shown in the figures. Before applying this bandage a cotton packing is placed around the scrotum.

W. Gifford Nash, of England, ², reports a case of acute torsion of the spermatic cord, which he was able to reduce and relieve, thus saving the testicle, without having recourse to a cutting operation. This is probably the first case on record where such treatment has been tried or has been successful. The case was that of a 19-year-old boy, who was suddenly taken, during exercise, with a severe pain in the right testicle. The author promptly saw the case and found the right testicle swollen and tender. The epididymis also was in front and a knotty condition of the cord could be detected. Suspecting the condition he had to deal with, Nash tried to untwist the cord. Rotation to the left was first tried, but this increased the patient's pain, and the testicle would not stay in position. Rotation to the right was then resorted to, with the result that the patient immediately felt perfect relief from pain, and the testicle remained in place with the epididymis posterior. Speedy recovery ensued. A. E. Barker, of London, ⁶, and B. von Sweringen, of Fort Wayne, Ind., ¹¹², both report cases of acute torsion where, on operation, a gangrenous testicle was discovered.

J. Englisch, of Vienna, ²⁸³, _{Feb. 28, Mar. 7}, reports two cases of the rare condition of hæmorrhagic infarction of the testicles, and states that the origin of the morbid changes in these cases seems to be a thrombosis of the pampiniform plexus. The affection generally commences with peritoneal symptoms, followed in two or three days by considerable swelling of the testicles, associated, however, with but little tenderness. Sometimes the inflammation is so extensive that the scrotum presents an appearance of phlegmon. In such instances there may be a collapse. The disease is presumably of an infectious nature. If an incision is made the testicle and cord are found to be suffused and congested, and the structure of the testicle appears dark-brown in color. Microscopical examinations show the lesions to be non-inflammatory. Experiments on animals have shown that ligation of the internal spermatic artery, as well as the pampiniform plexus, produces the same appearances as found in hæmorrhagic infarction. Englisch has frequently observed in children, chiefly in those born in the breach position, hæmatomata which somewhat resemble hæmorrhagic infarction. Nicoladoni regards torsion of the vas deferens a possible factor in its causation. Expectant treatment is advised.

Hydrocele.—Lieutenant-Colonel Hall, of India, ², reports nineteen hydroceles perfectly cured by slitting up the scrotum and tunica vaginalis by an incision an inch long, stitching the tunica vaginalis to the scrotum, and applying an antiseptic dressing. The cavity was not injected or interfered with in any way. Joseph Hearn, of Philadelphia, ⁸⁰, advocates a small incision the same as Hall has adopted. Hearn, however, has always thought it necessary to swab out the cavity of the tunica vaginalis with pure carbolic acid liquefied by heat, and to leave an iodoform-gauze tent in the incision, in order to insure a cure.

Orchidopexy.—Jalaguier ¹⁴, reports 15 operations of orchidopexy performed by himself upon 13 subjects during the last four years. Seven of these subjects were over 12 years old and 6 under that age. Hernia was encountered in 6 of the operations. Fourteen were successful. In 2 cases, at the end of from thirty to thirty-six months, the testicles had become normal in size, and in 12 others, at the end of from three to fifteen months, the organs were movable, sensitive, of normal consistence, and showed no tendency to retract. The author states that in cases where the testicle is retained in the inguinal canal and fails to descend, as the result of massage, there exists a fibrous band, apparently connected with the cribriform fascia, which confines it. This operation is advocated in cases over 5 years of age and in younger cases, provided there co-exists a painful hernia. Terrillon ¹⁴, reports 6 orchidopexies upon children ranging from 9 to 15 years. Congenital hernia was associated in 4 instances. In 3 cases the result was very satisfactory. As regards the other 3 cases, in 1 the testicle retracted again, and in the other 2 atrophy took place. W. af Schultén, of Finland, ²¹¹, reports 2 cases operated on a year and a half ago, with good results. In 2 other cases he had to perform castration, as it was impossible to fasten the testicles to the scrotum. In these 4 cases hernia co-existed, more or less developed. In 1 case it was strangulated.

Guillot, of Reims, ²⁶⁶, reports the result of a case of orchidopexy which he performed two years ago for abdominal ectopy. Both testicles were in the abdomen, one only of them being brought into the scrotum. At the time of making the report the boy, 18 years of age, had a well-developed testicle, together with natural erections and emissions. Examination of the seminal fluid showed

the presence of a few apparently perfectly normal spermatozoa, and of others deformed or broken.

Félixet¹⁴,_{xx.12} states that when an ectopic testicle is movable it is almost always normal in form, volume, and consistence, in which case, if an enlargement of the inguinal canal is effected, the gland will almost invariably descend into the scrotum. When the organ is fixed it will usually be found to be altered in size and texture, and to be painful.

L. A. Bidwell, of London,⁶,_{xx.17} has invented a wire cage to fit about the scrotum after the operation of orchidopexy. From the bars of this cage an elastic band is fastened, which is in turn attached to a silk ligature through the scrotum and through the end of the ectopic testicle, in order to accomplish, as it were, a counter-extension.

Joseph Griffiths, of Cambridge, England,²⁷,_{xx.11} has written two interesting articles on the structural changes in the testicles of aged persons and in those of the dog when replaced in the abdominal cavity. As regards aged persons, degenerative changes tend to occur, although the time and extent of these occurrences vary greatly in individual cases. The pathology of the changes is divided into two stages: (1) fatty degeneration of the epithelium of the tubules of the testicle proper and of the epididymis, and (2) sclerotic changes in connection with the connective tissue. With reference to dogs, the experiments included both pups and grown animals, the testicles being replaced in the abdomen by operative procedures. The author concludes, as regards pups, that although the abdominal testicle develops somewhat up to the time of puberty, it never develops sufficiently to produce spermatozoa. In the case of grown dogs, the testicle, after being placed in the abdomen, was found to decrease in size from one-third to one-half, and to lose its power of producing spermatozoa.

Orchitis and Epididymitis.—Comby¹⁷,_{xx.6} records an interesting case of mumps in which a violent orchitis occurred, accompanied by high fever, delirium, and haemoptysis. (During the last year we have had a case in our practice similar in most respects, except for the haemoptysis.) Fiessinger, of Oyonnax,⁵⁵,_{xx.4} records a case of orchitis occurring during an attack of influenza. Elsenberg, of Warsaw,⁶⁷³,_{xx.9} reports three cases of idiopathic orchitis and epididymitis which appeared without apparent cause. Hallopeau and Jean-

selme¹⁴_{Mar. 11} report a case of acute leprous orchitis. Ozenne, of Paris,¹⁰⁰_{Feb. 22; Aug. 9}, reports success in one case of tuberculous epididymitis, and favorable progress in a few others, from injections of chloride of zinc, after the method of Lannelongue. In the successful case he injected at four sittings, in seven different spots of the diseased area, the chloride-of-zinc preparation, 2 drops being used at each puncture. Moderate temporary reaction followed. Some months after, one little tuberculous nodule remaining, a single injection was given. After the last treatment all active signs of the tuberculosis disappeared. H. Mynter, of Buffalo,⁹⁶_{Apr.} adds his authority to what is now coming to be the accepted opinion of those who are versed in the subject, to wit, that where operation is needed, in the case of tuberculosis of the epididymis, it is only necessary to remove the offending epididymis, the testicle being left undisturbed.

Bokai and Meisels, of Budapest,⁸⁹⁹_{June 10; Aug. 22}, claim to have successfully treated twenty-seven cases of spermatorrhœa by the internal administration of $\frac{1}{20}$ to $\frac{1}{10}$ grain (0.003 to 0.006 gramme) of citrate of cornutine per day. Six to eight days' treatment was all that was necessary in most cases.

SEMINAL VESICLES, ETC.

Seminal Vesiculitis.—Eugene Fuller, of New York,²⁴⁵_{Sept.} after calling attention to the unsatisfactory results which have so far, as a rule, attended the management of these cases, owing not only to errors in diagnosis, but also to the non-existence of any efficacious form of treatment, records the results of his investigations. Outside of tubercle, and very rarely malignant disease, gonorrhœa is found to be the cause in the great majority of instances. Masturbation, sexual excesses, and long-continued nervous strain account for most of the other cases where gonorrhœa has not existed. The disease is considered to be quite frequent. Among symptoms, disturbances of the sexual function are most important and frequent. Usually there is a marked diminution in desire, and sometimes it is wholly lost, rarely being increased. The history of erectile power corresponds closely to that of sexual desire. In the cases, however, where the desire is increased, little relief is experienced from coitus. During coitus the ejaculations are irregular, precipitate, or tardy, often painful, and frequently followed

by a sense of depression. In many instances involuntary emissions are a feature. A study of the character of the emissions is also important. Where the disease is at all extensive, the spermatozoa from the involved vesicle are dead. The co-existence of pus is expected, especially in the gonorrhœal cases. Sometimes blood also is present. Many other less-important symptoms, such as disturbances of micturition, often accompanied by pain and many dependent reflex nervous phenomena, are recorded. In making a diagnosis, a finger in the rectum, the bladder being full, will often detect a pathological condition of the vesicles. The process of stripping the vesicle with the tip of the forefinger, in order to force the contents, in case there is disease, out of the ejaculatory ducts so that it can be collected from the urine and examined, in order to verify the diagnosis, is fully described. The treatment advocated, and which has been successful in numerous instances at the hands of the author, and of Keyes, who has been a co-worker in these investigations, is the systematic stripping of the diseased vesicles by means of the forefinger in the rectum in all chronic, non-tubercular, or non-malignant cases. The author asserts that, if the expulsive function of the vesicle, which has been largely lost by reason of its distension by inflammatory products, can be restored by keeping the sac empty for a time, thus allowing repair to take place in the muscular fibre, the organ, eventually, during coitus, and as a result of seminal emissions, will empty itself, and nature will thus be able to complete the cure. The histories of a number of cases are given where a cure or marked relief of symptoms resulted from this treatment, though if it be overdone there is danger of stirring up an epididymitis or an acute vesiculitis.

Urinary Neurasthenia.—Guyon²⁸⁶ contributes an article describing the various forms of neurasthenia involving the genito-urinary organs. In these cases the author maintains that there is nothing organically wrong, although the finger in the rectum usually discloses a very sensitive condition of the prostatic region. As the symptoms in a number of these cases correspond exactly with those pertaining to the cases of seminal vesiculitis described by Fuller in the article just referred to, and as Guyon states that in many of his cases the commencement of trouble was coincident with a preceding gonorrhœa, it seems to us but reasonable to sup-

pose that if Guyon had made an examination of the seminal vesicles he would have found, in many instances, a condition of seminal vesiculitis which, if cured, would have relieved his patients of their neurasthenia.

Peritonitis in Man from Gonorrhœa.—Max von Zeissl, of Vienna, ²⁸³, after a thorough review of the literature, reports three cases of peritonitis, under his observation, evidently due to acute gonorrhœal seminal vesiculitis. After considering the experiments of Reymond and Hallé, reference to which has already been made, which have demonstrated the ease whereby, under proper conditions, germs can penetrate the bladder-walls, one can readily imagine how little resistance the comparatively thin walls of the vesicles might offer when distended and inflamed. P. Mermet ⁵⁵ and de Belval ²¹² both report cases of peritonitis originating from acute gonorrhœa. In de Belval's case the peritonitis became general, death resulting.

URETHRA.

Pyæmia from Urethral Infection.—Heis ⁴, _{n.s. n.s.} reports a case of death from pyæmia, the source of which was a gonorrhœa of three weeks' standing. At the autopsy an ulcerative endocarditis and thromboses of the veins of the pubic plexus were the chief features of interest.

Suppuration of Cooper's Gland.—Dubuc ¹⁵², _{n.s. n.s.} reports a case illustrating this condition occurring during the course of an acute gonorrhœa. The abscess was drained by means of a perineal incision, a urinary fistula resulting, which resisted treatment for a long time, but healed, however, finally. P. Bazy, ⁷³, in an interesting article on urinary abscesses, calls attention to suppuration of Cooper's gland, of which he has seen five instances, all terminating in fistulæ, the cure of which is always difficult. Gonorrhœa was the cause of the suppuration. In making a diagnosis an abscess of Cooper's gland is distinguishable from a perineal abscess in the following particulars: (1) it is lateral; (2) it usually spreads to one side of the anus, or into the ischio-rectal region; (3) it has a great tendency to result in fistula.

Voluminous Urethral Calculi.—Loumeau and Dorlan ¹⁸⁸, _{A.P.S.} record a case of urethral calculus which was eight centimetres long. Before its removal the patient was, as it were, in a state of per-

petual erection. Kurbatow³³⁶ also reports a case of enormous urethral calculus. In this case the scrotum was riddled with fistulae.

Polypus of the Deep Urethra.—Thos. Bryant² reports such a case in which the polypus was the cause of obscure symptoms, chief among which were haemorrhage and occasional retention. Removal of the growth effected a cure.

Ulcerations of the Urethra.—Casper, of Berlin,⁶⁰ reports two cases of ulceration of the urethra, both of which yielded speedily to antisyphilitic treatment. The first one the author thinks to be gummatous, as there is a previous history of syphilis. The second one he believes to be chancroidal, as there is no history of syphilis. (From reading the article one would be inclined to consider the second case gummatous rather than chancroidal.)

Treatment of Gonorrhœa.—Samter, of Berlin,⁴ disproves the



PROFILE VIEW OF CALCULUS. (LOUMEAUX AND DORLAN.)

P. A., anterior extremity; P. P., posterior extremity; N., elevation occupying median form.

Journal de Médecine de Bordeaux.

assertions of Chotzen that alumnol is a specific in the cure of gonorrhœa. Researches with this drug have been made in twelve cases. The results were negative. The writer concludes, therefore, that alumnol exercises no action on the gonococcus and does not shorten the duration of the gonorrhœa. Casper, of Berlin,⁴ has also made experiments with the drug, and his conclusions are that acute gonorrhœa is but little affected by it, either for better or worse, and that in chronic gonorrhœa it is inferior to nitrate of silver. L. L. von Wedekind, U. S. Navy,⁵⁰ and J. J. Sullivan, of New York,¹⁷⁸ both advocate peroxide-of-hydrogen injections in the treatment of acute gonorrhœa. A number of cases are reported where the course of the disease was apparently much abridged by this treatment. In some instances the standard 15-volume strength of the drug was used, but in most cases this solution was diluted. H. M. Christian, of Philadelphia,⁸⁰ states that

since 1891 cases of acute gonorrhœa coming to Martin's clinic have been treated for three or four weeks simply by the internal administration of balsamics. At the end of that period, the discharge being very thin and scant, injections are employed. The author compares the statistics of 150 cases treated in this manner with those of 150 cases in which he had employed injections during the acute stage. In the former series, in 134 cases the disease was confined to the front urethra; in 12 the posterior urethra was involved; in 4 epididymitis resulted. In the latter series, in 85 cases the disease was confined to the anterior urethra; in 52 the posterior urethra was involved; in 13 epididymitis resulted. The same author⁵⁰ has tried the treatment for acute gonorrhœa advocated by Coates and Slater, of London⁶ (i.e., mopping out the inflamed area of the urethra with a 10-per-cent. solution of nitrate of silver through an endoscope), and has failed to get the results claimed for it by its advocates. E. Chancellor⁶¹ recommends campho-phénique, 3i-ij (4 to 8 grammes); benzoated zinc-oxide oint., 3j (31 grammes); and sweet-oil, ad 3iv (124 grammes), as an injection in specific and non-specific discharges. W. Frank Glenn, of Nashville,²⁴⁵ reports further successes with his chloride and iodide-of-zinc injection. Guiard²⁴ has had good results in the employment of irrigations of weak solutions of permanganate of potash, as recommended by Reverdin and Janet. Grizwow, of Sebastopol,⁶⁷³ thinks well of the internal administration of 1.5 grammes (24 grains) of salol three or four times a day. R. W. Barton, of Arkansas,¹⁸⁶ advocates: Rx Acid. carbol., 3j (4 grammes); syr. acaciæ, q. s.; syr. simplicis, ad 3xxx (114.5 grammes). A teaspoonful in a wineglassful of water four times a day. John E. Bacon, of Wellsboro, Pa.,⁷¹ having used kava-kava in eighty-two consecutive cases of gonorrhœa, recommends it, and concludes that it may be given in any stage of the disease; that it renders the urine alkaline, besides having some antiseptic action. It also has an anæsthetic effect on the urinary tract. The dose is $\frac{1}{2}$ to 1 drachm (2 to 4 grammes) of the fluid extract every four hours. Friedländer¹¹⁶ has been investigating pichi, and states that in some cases its action on acute gonorrhœa and various other inflammatory states of the genito-urinary tract is very beneficial. G. Frank Lydston, of Chicago,²²⁴ and B. H. Daggett, of Buffalo,¹⁷⁰ have both made a trial of irrigating the urethra and bladder without a

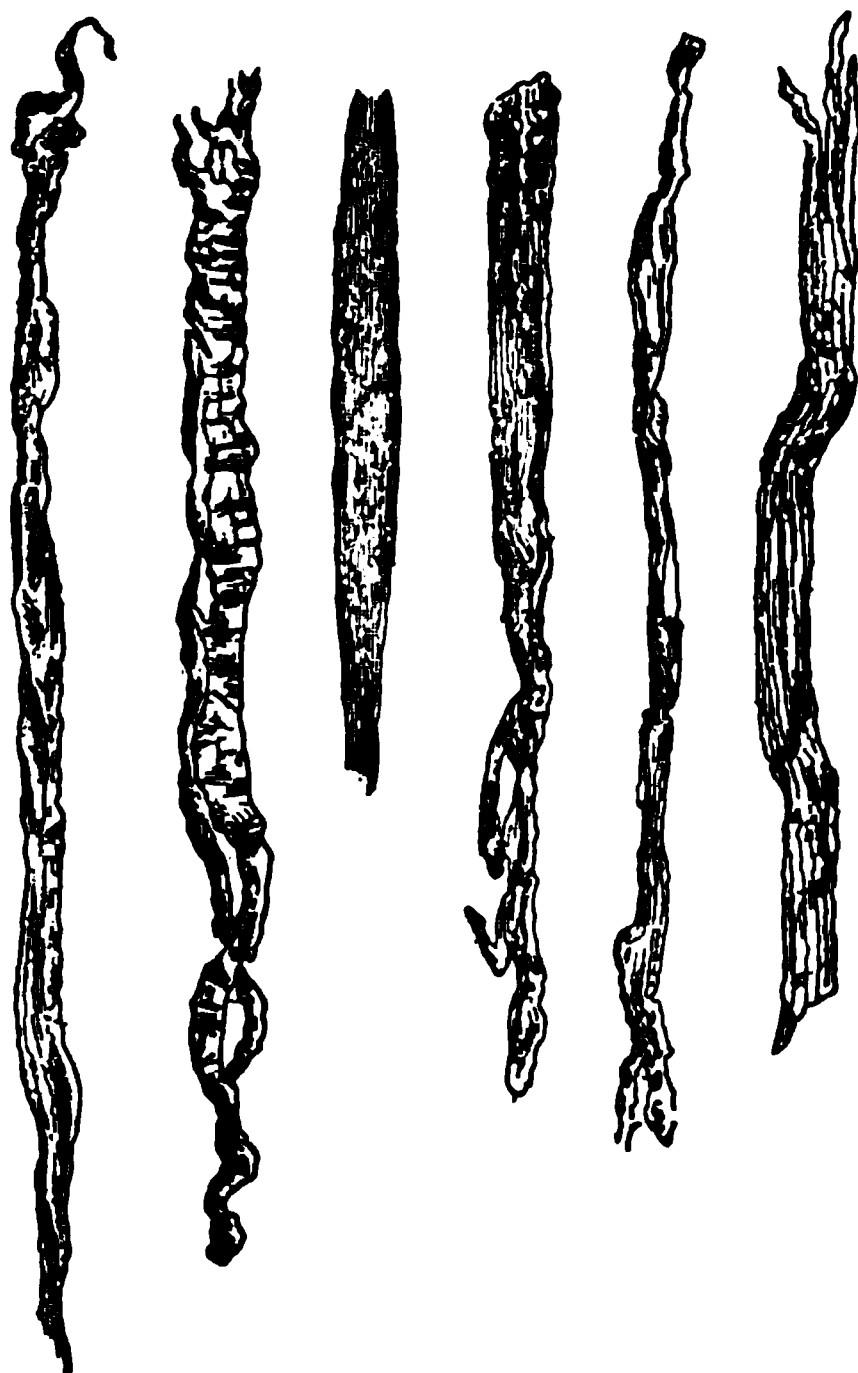
catheter by applying a nozzle to the meatus and using enough force to make the fluid enter the bladder. They think well of the procedure for some deep urethral and bladder inflammations.

Membranous Desquamative Urethritis.—W. W. Battle, of London,⁶ reports a case of this rare condition, giving cuts representing in a general way the appearance of the urethral casts. This form of urethritis developed in a urethra in which there previously existed a chronic urethritis.

Etiology and Nature of Catarrhal Urethritis in Male Children.—S. Rona, of Budapest,⁴⁵ considers that this condition in male children corresponds exactly to gonorrhœa in adults as regards its course and complications. Its etiology, however, he considers very obscure. (Probably most of these cases are true gonorrhœa. This question can, however, be settled only by further bacteriological investigation.)

Chronic Urethritis.—

Ernest Finger⁵⁷ publishes an article on the pathological and clinical anatomy of chronic gonorrhœal prostatitis. The history of these cases is as follows: In the first place, the deep urethra, in the earlier stages of the disease, becomes thickened and the caput gallinaginis much increased in size by reason of inflammatory infiltration. The cylindrical urethral epithelium is replaced by pavement epithelium. Later, a process of connective-tissue proliferation and contraction takes place in the infiltrated parts. The urethral walls and the caput gallinaginis become hard and gristly. The prostatic as well as the ejaculatory ducts are, consequently, pressed upon and their mouths partially or wholly obstructed. These processes, extending along



CASTS FROM A CASE OF DESQUAMATIVE
URETHRITIS. (BATTLE.)
London Lancet.

the excretory ducts, produce the same changes in connection with their walls which have just been noted in connection with the walls of the deep urethra, chronic prostatitis and vesiculitis resulting.

R. W. Stewart, of Pittsburgh,¹⁶¹ in a very thorough article on chronic urethritis, shows, as the result of many measurements with his urethrometer and urethrograph (mention of which instruments has already been made in a previous edition of the ANNUAL), what he considers to be the natural dimensions of the urethra.

The accompanying cuts, taken from this article, represent the urethra (1) at rest as a closed canal; (2) moderately distended, as in the act of urination, and (3) greatly distended.

Bransford Lewis, of St. Louis,⁵⁹ in an article on the rôle of the posterior urethra in chronic urethritis, after reviewing the literature and recording his own observations, draws the following conclusions:

1. The causes usually given for the prolongation of cases of gonorrhœa (presence or absence of gonococci, stricture of large calibre, the use of particular drugs in treatment, etc.) do not satisfactorily explain them, nor do they furnish reliable means for prognosticating the outcome of a case.
2. A single widely-prevalent cause for such prolongation of gonorrhœa has, as yet, not proved its right to recognition as such.
3. Posterior urethritis, by reason of its anatomical seclusion and inaccessibility to ordinarily prescribed treatment, if frequent, offers the best explanation for such prolongation or repeated recurrence.
4. Scrutinizing clinical investigation shows posterior urethritis to be present in the great



NATURAL DIMENSIONS OF URETHRA. (STEWART.)
Pittsburgh Medical Review.

particular drugs in treatment, etc.) do not satisfactorily explain them, nor do they furnish reliable means for prognosticating the outcome of a case. 2. A single widely-prevalent cause for such prolongation of gonorrhœa has, as yet, not proved its right to recognition as such. 3. Posterior urethritis, by reason of its anatomical seclusion and inaccessibility to ordinarily prescribed treatment, if frequent, offers the best explanation for such prolongation or repeated recurrence. 4. Scrutinizing clinical investigation shows posterior urethritis to be present in the great

majority of cases of prolonged or severe gonorrhœa. 5. Direct topical treatment to the posterior urethra is, therefore, necessary in the great majority of cases. 6. The causes usually given for producing posterior urethritis are not commonly found to be real factors in the clinic. 7. The mode of onset usually described does not coincide with that discerned in clinical observations. 8. These two latter observations confirm the probability that the posterior urethral infection is accomplished through the lymphatics, and explain the frequency of such infection. 9. Posterior urethritis is not a complication, but a natural phenomenon of gonorrhœa.

Stricture.—W. H. Bennett, of London,¹⁰⁷⁷ publishes an interesting case of tight stricture accompanied by perineal fistula. The stricture, which was the cause of the secondary fistula, was due to a localized syphilitic infiltration of the urethra. After a course of mercury for six weeks, the stricture disappeared and the fistula healed, no local treatment being employed. E. Fuller²⁰⁴⁴ also records a case of syphilitic urethral stricture. In Fuller's case dilatation by sounds had been attempted before the case came under his observation, with the result that the stricture had become tighter instead of larger after each sounding.

G. Buckston Brown² states that the object of his paper is an attempt to prove that the worst cases of urethral stricture can be treated at one operation without any painful preliminary instrumental treatment and without any perineal incision. He quotes Syme's statement that if urine comes out of a bladder through a urethra, a surgeon should be able to pass an instrument through that urethra into the bladder, and states that when once an instrument has been fairly passed into the bladder it may at once be withdrawn and replaced by one of a larger size, and, thus dilated, a Civiale urethrotome may be introduced and the stricture or strictures cut so that 15 or 17 English may be passed into the bladder. To attempt this procedure, the author insists that the surgeon should never be in a hurry, and should never try it in an operating theatre before a crowd, but should operate best in a quiet bed-room, with plenty of time at his command. The patient should be anæsthetized, and at the end of the operation a soft-gum catheter should be left tied in. The various steps in the operative procedures are carefully detailed.

E. R. Palmer, of Louisville,²²⁴ maintains that it is proper and

safe to cut tight strictures of the bulbo-membranous junction by internal urethrotomy, perineal drainage being unnecessary. He has done as many as fifty such operations without a resulting complication.

C. Mansell Moullin, of London, ^{Nov. 12, '96} claims that the pathology of strictures should be more carefully considered. In the main they can be divided into two great classes, one in which the whole thickness of the lining membrane of the urethra has been destroyed at some spot and the other in which it has not. In this second division the stricture is generally due to a peri-urethral infiltration and thickening, caused by an inflammatory exudation in the neighborhood of a group of urethral granulations. Under this second class come most of the strictures resulting from gonorrhœa, and in connection with such strictures there is no real cicatrix. In order to cure this second class of cases, the author advocates either internal urethrotomy, after a thorough gradual dilatation with sounds has been accomplished, or, what is more likely to succeed, external urethrotomy with perineal drainage for a considerable period. By these means the author argues that all spasm in connection with the exudation is removed, thus permitting the exudate gradually to undergo fatty degeneration and to be absorbed.

Reliquet and Guépin ⁷⁸ _{May 20, '77; June 8} call attention to the frequent error in diagnosis between simple urethral spasm and organic stricture. The causes for spasm are enumerated, among them being a tight prepuce, narrow meatus, occasionally inflammation of Cooper's glands, faecal impaction, haemorrhoids, and numerous other conditions which, by reason of reflex nervous action, produce spasm of the deep urethra. Many illustrative cases are recorded. A. Peyer, of Zürich, ²¹⁴ _{Nov. 1, '96} discusses imaginary stricture and ²¹⁴ _{July 16} important pathological changes in the urinary stream, including urinary dribbling, treating largely of urinary spasm and giving many illustrative cases.

Von Hebra, of Vienna, ⁴¹ _{Aug. 23} reports two cases of tight urethral stricture cured by absorption, by means of a few subcutaneous injections into the general circulation of half a Pravaz syringeful of a 15-per-cent. alcoholic solution of thiosinamin. Relief was experienced by the patients almost immediately, and a cure resulted after several days. The author's statements read like a fairy tale.

It will be interesting to see the results of further experiments with this drug.

O. Zuckerkandl, of Vienna,³³⁶ in an article on external urethrotomy, advocates a slight modification in von Dittel's method of entering the urethra behind the stricture, by means of a half-moon-shaped transverse cut across the perineum. Zuckerkandl considers that the same result can be accomplished by making the usual perineal cut along the median raphé, and extending it clear down to the anus. W. F. Fluhrer, of New York, ¹, advocates an improved technique in the operation of external urethrotomy, giving illustrations of the proposed improvements.

Urinary Fistulæ.—Reginald Harrison, of London, ²², in an article upon some external urinary fistulæ, describes the various forms of urinary fistulæ, together with the treatment which he has found beneficial in each of the varieties. F. Legueu, of Paris,²⁶⁶ reports a case of traumatic urethro-rectal fistula, which he cured by making a transverse cut above the rectum and then making a dissection, as in von Dittel's operation for removal of the prostate. The fistulous tract was thus cut through, and the operator was enabled by sutures to close both the urethral and the rectal openings. The perineal dissection was then closed by a double layer of sutures, one deep and one superficial.

Urethral Traumatism.—Thomas H. Manley, of New York,⁹⁶, acting on the suggestion of Wile, of Danbury, Conn., who had reported to him a case of rupture of the deep urethra, which he had apparently cured by immediate perineal section and suture of the urethral ends, performed perineal section in two cases of traumatic stricture which are reported, and resected the strictures. The resected urethral ends were then brought together by suture. The results were very satisfactory. At the time of operation the author was ignorant of the recent results obtained in the same field by French surgeons, reference to which was made in last year's ANNUAL.

Pearce Gould, of London, ⁶, reports two successful cases of immediate suture of the ruptured urethra. Boisson ²⁸⁰ and Rudolph Frank ⁵⁷, each report one such successful case. Delorme ¹⁰⁰, _{Dec. 10, 1900}, reports a case of rupture where, two months after the injury, he found the space of two centimetres between the fractured ends largely filled with fungosities. These were removed with a curette. The ends

of the fractured urethra were then freshly abraded with a bistoury and brought together by suture. The condition of the patient was satisfactory four months after the operation.

Poucet²⁷,₁₂₀ reports a case of extensive destruction of the urethra, in which he regarded his operation of urethrostomy indicated, as it was impossible to re-establish the function of the urethra. Legueu and Cestan,²⁸⁸₁₂₀ in an article on "Operative Indications in Traumatic Strictures of the Urethra," describe the different degrees of traumatism, and indicate the operative procedure which they consider best adapted to each class. Illustrative cases are reported.

Electrolysis.—Desnos, of Paris,²⁰⁸₁₂₀ publishes a complete and valuable article on experimental researches with urethral electrolysis. Several plates show the appearances of dogs' urethræ which had been previously subjected to the influence of the current. The experiments on dogs were divided into two classes. In the first class traumatic strictures were made, and then later attempts at a cure with electrolysis were made, and in the second class the effects of various currents on the normal urethra were observed. Besides these experiments, 46 patients suffering with stricture were treated, 21 by a weak current of from 3 to 5 millampères, according to Neumann's method, and 25 by the linear method, with strong currents, as advocated by Fort. Out of the 21 cases treated by weak currents 12 were improved or cured. This method was found, however, to be extremely slow, weekly treatments for from two to thirteen months being necessary to effect a cure in the favorable cases. The results in the 25 cases with strong currents were disastrous. The following conclusions are given: 1. When the negative electrode is applied to a stricture and a comparatively feeble current (10 to 12 millampères) is employed, a foaming (*dièrèse*) quite marked is produced at the very first, which does not last long. If the stricture is tight or lengthy, it is necessary to double- or triple the intensity of the current in order to divide it. 2. When one has opened up a stricture in this manner it contracts again very rapidly, the tissues formed being hard and resistant. 3. The negative current applied by means of a blade to a normal urethra produces a slightly-foaming effect on the mucous membrane. The superficial part of the mucous membrane is cut through quickly. Then the effect of the current is arrested, and it is necessary to employ an intensity much increased in order to

cut a deep furrow. In such cases the destruction of the tissue is not limited to the spot touched by the electric blade, but extends along the surface, a superficial eschar resulting. 4. The passage of the current causes a marked congestion of the point electrified, and if the intensity is increased an ecchymosis and bloody, submucous effusions appear. 5. The application of the negative current to the healthy mucous membrane causes, after a short interval, a stricture which is traumatic in character. 6. When weak currents, as advocated by Neumann (3 to 5 milliamperes), are applied to the mucous membrane, no appreciable changes are observed either at the time or later.

C. Mansell Moullin ⁶, has made some experiments with weak currents. He, however, is not impressed with the usefulness of

"PERFECTED" URETHROSCOPE (Otis.)
New York Medical Journal.

the method. Reynier ⁷ reports bad results with strong currents. (The electrolysis treatment of stricture is evidently losing ground.)

Urethral Instruments.—W. K. Otis, of New York, ¹ presents his "perfected" urethroscope. The instrument is adapted to Klotz's endoscopic tube. Otis states that hitherto urethoscopes have been heavy, complicated in construction, and expensive. To overcome these objections he has devised an instrument on entirely different principles from former ones by using a lens as a condenser instead of reflected light from a concave mirror. E. Hurry Fenwick, of London, ² comments on Otis's term "perfected" with reference to his new urethroscope, and states that no urethroscope is perfected unless it is fitted with an inflating apparatus whereby the urethra can be blown out for inspection, like the

finger of a glove. Fenwick presents his aëro-urethroscope, in constructing which the inflation method of Geza von Antal was adopted. James McMunn, of England, ²² presents several urethral and prostatic instruments, among them a urethrometer with a urethrograph attachment. The idea of the instrument, as well, apparently, as the mechanical construction, seems to be extremely similar to the instrument offered to the profession some years ago by Stewart, of Pittsburgh. A copy of Stewart's instrument, together with a description, will be found in the ANNUAL for 1890, vol. iii, E-13 and 14.

Edward Cotterell, of London ²; J. W. Williams, of Paterson, N. J. ⁹; W. E. Burton, of London, ² and T.

AËRO-URETHROSCOPE. (FENWICK.)
British Medical Journal.

Robinson, of London, ², have all presented urethral irrigators or injectors. H. Goldenberg, of New York, ⁵⁹, has invented a new endoscopic obturator, the mechanism of which is the same as that employed by the late Dr. Elliott, of New York, in his uterine repositor. By means of a screw arrangement of the handle the



ENDOSCOPIC OBTURATOR. (GOLDENBERG.)
New York Medical Record.

distal end is made to curve, the extent of the curvature being recorded by a dial.

J. Grünfeld, of Vienna, ⁵⁷, publishes an article on endoscopic methods of investigation.

BLADDER.

Pericystitis.—Noel Hallé ²⁰⁸ devotes a long article to this hitherto rather obscure subject, the points being emphasized by

illustrative cases in detail. Acute phlegmonous inflammations of the space of Retzius are not included in the author's considerations. These pericystites are chronic in character. They may involve the whole outside of the bladder, though more frequently they are localized, involving the summit and the base. At the base they usually bind together the prostate and vesicles extending along the course of the ureters, filling up the V-shaped space between the lower part of the ureter and bladder-wall. The true variety arises from inflammatory vesical causes, the effects of the inflammation penetrating the bladder-walls. There is also a false variety, the origin of which is intestinal or genital. The true variety, when simple in character, is sclerotic, sclero-adipose, or suppurative. When suppuration exists it may persist as numerous non-communicating abscesses outside the vesical walls, it may break through the walls and thus form a communication with the bladder, or it may involve the peritoneum and cause adhesions, becoming finally encysted. Sometimes these inflammations are not simple, but tuberculous or neoplastic in character. When the origin of peri-vesical inflammations are not vesical, but intestinal or genital, fistulous communications extending to the bladder-cavity from the origin of disease are quite common. The existence of pericystitis of vesical origin is usually first discovered at autopsy.

Pathology of Cystic Tumors Connected with the Bladder.—J. H. Targett, of London,²² states that the commonest form of cystic tumor is due to a pouch of mucous membrane which has forced itself between and through the vesical muscular layers owing to obstruction to the urinary flow. Sometimes, when the urine is foul, calculi and, very rarely, malignant growths form in these cysts. Among the rarer causes for cysts are hydatids, peri-vesical suppuration, perforation of the bladder by instruments, and congenital malformation, which last condition may be a cause for an allantoic cyst. The article is profusely illustrated by photographs from museum specimens. Braun²²⁸,_{14, p. 165} reports one of those rare malformations, congenital fissure of the bladder, such as Targett has just referred to as sometimes causing an allantoic cyst.

E. Martin, of Geneva,²⁰⁸ and P. Thorndike, of Boston,²⁴⁵ both report cases of idiopathic suppuration of the cavity of Retzius.

Evacuation of the Bladder by Pressure.—Wagner,⁸⁴ states that, in cases of paralysis of the bladder from lesions which impair its muscular tonus, the vesical sphincter may become so weak as to permit the urine being squeezed out by pressure over the pubes. This procedure Wagner advocates in preference to the catheter.

Stone.—H. M. N. Milton, of Cairo,⁸⁵ reports the extraction, by laparotomy from the bladder, of what he asserts is the largest stone ever recorded as successfully removed. The stone weighed 995 grammes (32 ounces). The subject was an Egyptian. A. W. Douthwaite, of China,²³⁵ reports a case of "auto-lithotomy." In this case a large vesical calculus, by exciting extensive sloughing and ulceration, worked its own way out of the body through the perineum. The perineal wound, after a time, healed, a perfect natural cure resulting.

Bazy, of Paris,¹⁴, considers the class of cases in which, although vesical calculi exist, the ordinary modes of exploration fail to reveal them. In such cases the calculus is usually in the post-prostatic pouch. (See also Buckston Brown's article, ANNUAL of 1892.)

Litholapaxy.—T. M. Shah, of India,²³⁹ reports 64 more cases of litholapaxy, having previously (in 1891) reported his first 20 cases. Out of these 84 cases he had 3 deaths. A. Malherbe, of Nantes,²³⁸ reports 76 operations practiced on 36 patients, with 2 deaths. The author operated once on 22 cases, twice on 6, three times on 3, four times on 2, five times on 1, and twelve times on 1. Keegan,⁸⁶ reports a further series of 50 cases of litholapaxy on boys, which makes, with the cases he has previously reported, 175 cases, with 4 deaths. The author, adding together all the Indian statistics for this operation, obtains a grand total of 663 cases, with 18 deaths,—a mortality rate of 2.71 per cent. In conclusion, the writer lays down the following rules to guide the inexperienced in performing the operation of litholapaxy in boys: The surgeon should be provided with an ample supply of perfectly reliable lithotrites, all of the completely fenestrated pattern, and with cannulæ with serviceable stylets. He should never withdraw a cannula from the bladder nor introduce one unless it be fitted with a stylet. Four ounces (124 grammes) of water should be the maximum quantity allowed to be in the bladder at any given moment. The aspirator should

be used gently and methodically, and water should not be injected into the bladder whilst the patient strains. Extreme gentleness and care are essential in practicing all manipulations of instruments in the bladder and urethra. The operator should not be in a hurry to finish the operation, and, if possible, he should not leave a grain of *débris* behind in the bladder. If all these conditions be fulfilled, a large measure of success will be obtained.

E. L. Keyes, of New York,²⁴⁵ reports a peculiar case of extravasation of urine, apparently in connection with the left kidney, which occurred during the operation of litholapaxy, being occasioned by the straining of the patient while under the anæsthetic.

Lateral Lithotomy.—John Ashurst, Jr., of Philadelphia,¹ in reporting his experience with vesical calculi, states that out of 50 cases he has adopted lateral lithotomy in 35. Of these 35 cases 20 were in boys. The writer concludes that the lateral operation is the best one in the case of boys. In this opinion, however, he is not supported by the great Indian authorities. Keegan,⁶ in the article just quoted, states that Freyer, who has achieved the unequalled success of having performed the operation one hundred and ninety-one times in boys without a death, has of late years almost abandoned it for litholapaxy. F. A. Southam, of Manchester,⁶ believes that the days of lateral lithotomy are numbered and that it will soon become an operation of the past. M. B. Thorn, of Turkey,¹⁷⁶ complains that, as an after-effect in cases where he has employed the lateral operation, and in which the operation was protracted by reason of the large size of the calculus, the ability of patients to retain urine was very much impaired, there being a constant dribbling. On account of this disagreeable after-effect the author thinks of giving up the lateral operation altogether.

Instruments for Crushing and Removing Urinary Calculi.—George Chismore, of San Francisco,²⁴⁵ publishes an article (brief mention of the reading of which was made in the last ANNUAL) descriptive of his new instrument, which combines in one a lithotrite and an evacuating tube with a stop-cock to which the wash-bottle is attached. He also presents a wash-bottle, the mechanism of which seems very free from complications. Chismore, in describing the workings of his combined instrument, states that although the calibre of the evacuating tube is small, still so much

time is saved in picking up fragments during the crushing, the evacuator tube sucking them in between the blades of the lithotrite, that really there is no delay in the operation. A number of cases are cited in which this instrument was used.

Cystoscopy.—O. K. Newell, of Boston, ⁵⁹, suggests in the use of the cystoscope, when a view is desired of the vesical base, that



COMBINED LITHOTRITE AND EVACUATING TUBE. (CHISMORE.)
Journal of Cutaneous and Genito-Urinary Disease.

the forefinger be introduced into the rectum and the floor of the bladder pushed up and thus brought into the area of observation. (In the minds of the editors the only difficulty with such an arrangement would be that in cases of post-prostatic vesical pouch, the ones especially requiring such a manipulation, the forefinger would not be long enough to reach beyond the hypertrophied prostate and raise the vesical pouch.) Boisseau du Rocher ⁸⁰⁰ has produced modified cystoscopes, one of which has the observation

WASH-BOTTLE. (CHISMORE.)
Journal of Cutaneous and Genito-Urinary Disease.

window looking ahead from the end of the straight shaft of the instrument, the electric lamp being at the end of the beak, also looking ahead. The other has the window and the light both lateral.

Cystophotography.—Nitze, of Berlin, ²⁰⁶ shows some beautiful photographs of vesical views obtained through his instrument and

Cystophotographie (Nitze).
Annales des maladies des organes génito-urinaires.



photographed by means of the ingenious device of Kutner, mention of which was made in the ANNUAL of 1893.

Distension of the infected and inflammatory bladder, according to Guyon,²⁶⁶ should not be allowed. The sanitary condition of the bladder and the treatment of prostatics are discussed by Legueu.²⁶⁶ Both these writers advocate the "*sonde à demeure*" in cases which are not severe enough to demand prompt drainage by a cutting operation. By this treatment the bladder-walls are kept contracted and at rest, the result being that germ absorption and proliferation are decreased and haemorrhage controlled.

Lactic-Acid Fermentation of the Bladder.—W. Roberts,⁶ records the case of an old man, a diabetic, habituated to catheter life, who never had to guard against phosphatic formations by reason of a lactic-acid fermentation which went on constantly in his bladder in connection with the grape-sugar in the urine.

Supra-pubic Cystotomy.—Zuckerkandl, of Vienna,²⁹⁷ publishes 60 cases of this operation from von Dittel's service during the last two years. Thirty-five of these were for stone, 3 for foreign bodies, 11 for tumors, 2 for posterior catheterization, 4 for vesical haematuria, 2 for stone and prostatic hypertrophy, 1 for rupture, 1 for tubercle, and 1 for retention where vesical puncture was impossible. In 2 of these cases Trendelenburg's transverse cut was made. In all possible cases the bladder was distended before operation. When this was impossible, a sound was introduced and the cut was made down on to the end of the instrument. The introduction of the kolpeurynter was considered unnecessary. In but 2 of these cases was the bladder-cut closed by suture, first intention being obtained in 1 case. There were no deaths and no infiltrations.

Lawson Tait, of Birmingham,⁶ in performing this operation, distends neither the rectum nor bladder. He simply pulls up the bladder-wall by the use of Koeberlé's forceps and incises it. A glass drainage-tube is left in the wound. R. Davy, of London,⁶ also distends neither rectum nor bladder. He, however, cuts down upon a sound introduced into the bladder. Bennett, of London,²² thinks distension of either organ before doing this operation unnecessary.

Albaran²⁶⁶ states that Guyon and himself have already succeeded in obtaining primary union of the vesical walls in eight

cases after the removal of vesical tumors. These high authorities hold that suture of the vesical walls, in the hope of obtaining primary union, should be attempted in all cases where there is a chance of success. Heretofore it has been so generally considered that primary union after removal of vesical growths would fail, owing to the tendency to intra-vesical haemorrhage, that it has hardly been attempted. N. Kümmell ¹⁷⁵ advocates immediate vesical suture after the removal of tumors of the bladder, three tiers of catgut sutures being applied, one each for the mucous membrane, the muscular structure, and the fibrous sheath. Guiard ²⁴, in appropriate cases sutures the bladder-walls immediately with catgut, and pierces the abdominal walls with Florentine gut, but does not tie these latter. The abdominal wound is then packed with iodoform gauze till it is certain that primary union of the vesical walls has taken place, when the gauze is removed and the Florentine gut sutures tied.

F. A. Southam, of Manchester, ⁶, is firmly opposed to immediate suture of the vesical walls. Von Dittel, as has been seen in the review of his cases of supra-pubic cystotomy, has only attempted primary union in two cases out of sixty.

Sorel ^{2012; 268} arrives at the following conclusions: (1) complete suture of the bladder ought to be attempted; (2) there are three contra-indications,—extensive traumatisms of the walls, marked pathological modifications of the walls, and haemorrhage from the walls. Infection is not of itself a contra-indication. (As Sorel was an interne at the Necker Hospital, he voices the opinion of that school.)

Desnos ²⁶⁶ advocates tamponing the bladder after supra-pubic cystotomy in cases of tuberculosis, and occasionally in cases of haemorrhage. Iodoform gauze is used in the tubercular cases, and carbolic gauze in the haemorrhagic. The gauze is packed about Guyon-Perrier siphon drainage-tubes. F. Cobb, of Boston, ⁹⁹, advocates, as a new idea, capillary drainage in supra-pubic cystotomy by means of a wick threaded through a rubber drainage-tube. Pilcher, of Brooklyn, some four years ago advocated this method. It was tried by the editors and discarded as impracticable.

Albarran, ²⁶⁸ after an historical review of transverse supra-pubic cystotomy, concludes that it is no graver than the longitu-

dinal, and that primary union of the vesical and abdominal walls can be obtained as well in this operation as in the ordinary longitudinal one. There is some danger of protrusion of the bowels during straining after the operation, but in the author's six cases no such accident occurred, and if the cut ends of the recti muscles are properly sutured it is little to be feared. This operation is indicated where there is to be much manipulation in the lower segment of the bladder (as in resections, prostatectomies, and ureteral catheterization), and in cases where the retro-pubic portion of the upper segment is involved. (In this last class of cases symphyseotomy is the operation of choice.) The transverse operation is also indicated in cases where vesical distension is not possible (as in some pathological conditions of the vesical walls), in ruptures, spontaneous and traumatic, and when the peritoneal *cul-de-sac* is fixed by adhesions down almost to the pubes,—a condition often existing after the longitudinal operation has been previously performed. The longitudinal operation should be chosen in the cases of children, and in all cases of double inguinal hernia; also in cases of calculi, foreign bodies, and in operations which have to do with the upper portion of the bladder. When the transverse operation is employed, the Trendelenburg position should be maintained until the bladder is opened.

R. W. Parker, of London,² advocates the transverse operation and records three cases in which he practiced it. In the discussion which followed Parker's paper, H. B. Robinson advocated the procedure and reported two cases. Buckston Brown, in one case where he had divided the recti muscles, had had bowel protrusion and was, consequently, a very conservative advocate of the transverse cut. Keyes has performed the operation once, in the course of a prostatectomy in a case where the longitudinal cut had been made some years before in order to remove a vesical calculus. The operation was not found to be difficult, and the Trendelenburg position was not required.

Symphyseotomy.—Albaran³,₁₀ has adopted this procedure in accomplishing the removal of vesical epithelioma. The bones were separated about two inches in order to obtain sufficient space for the vesical manipulations. The case was successful. Wickhoff, of Vienna,⁸,₁₁ as the result of experiments on the cadaver made to test the advantages of symphyseotomy over epicystotomy, recom-

mends the former for prostatic operations and for the removal of neoplasms.

Tumors.—E. Hurry Fenwick, of London,² in an interesting clinical lecture on one hundred cases of tumors of the urinary bladder, states that 92 per cent. of benign and a large proportion of malignant growths mark their transition from their latent first period to the second period of their existence by the appearance of blood in the urine. He strongly condemns careless treatment in these cases, whereby cystitis is caused, since under such circumstances the growths have a great tendency to infiltrate the bladder-walls, thus rendering their complete removal difficult. He has operated thirty-two times with the definite object of removing tumors which he had previously diagnosticated with the cystoscope. In thirty of these cases he removed the growth, two deaths resulting. In concluding, the author makes the following statement regarding diagnosis from cystoscopic appearances: “I may mention that I am much influenced, among other conditions, by the color of the tumor. If the tumor surface be translucent and of a pinkish hue, and exhibits no signs of necrosis, I know that I am dealing, at least, with a growth in a favorable stage. The smoother the tumor, the more I am inclined to suspect its deeper origin, for surface epitheliomata have a great tendency to produce a true villous surface. If the tumor is white, or greyish-white, I invariably diagnose epithelioma. It is also extremely suspicious of malignancy to see a powdering of white phosphate of lime upon a tumor which has only lately declared itself.”

Bazy,³⁰³ after reciting the indications for operation, states that the supra-pubic operation is the one to be chosen; that it is never necessary, in removing vesical tumors, to disturb the bony pelvis; and that vesical suture should be attempted in suitable cases. N. Kümmell⁴⁷⁵ and D. Wallace, of Edinburgh,³⁶ both publish articles on vesical tumors, in which their ideas and experiences are recorded.

Caisson Work in Bladder Surgery.—E. Hurry Fenwick,² as shown in the illustration, introduces, on the same principle as a caisson is used in laying the foundation of a bridge under water, a thin, white, porcelain tube through the supra-pubic cut down to the spot of the bladder requiring operation and inspection. The fluid in the tube is then sucked up by a syringe and the space

lighted by electricity, thus enabling the operator to attack the exposed spot with ease and assurance.

The Failure of Digital Exploration of the Bladder as a Diagnostic Procedure in Certain Cases of Obscure Urinary Disease. —E. Hurry Fenwick,²⁸ in an article under the preceding heading, shows how much more positive results can be obtained by means of the cystoscope and supra-pubic cystotomy than by the



CARBON WORK IN BLADDER SURGERY. (FENWICK.)
British Medical Journal.

perineal operation, together with digital exploration, as advocated by Thompson.

Rupture of the Bladder.—Schlanger,²² reviews the literature of this subject very thoroughly. He has collected 32 cases, 22 of which are intra- and 10 extra-peritoneal. Of the intra-peritoneal cases 10 recovered. Of the extra-peritoneal ones 7 recovered. H. Aue, of St. Petersburg,²⁰; J. B. Herrick, of Chicago, and O. Johannsen, of Libau,²¹ have also written on this subject. The general opinion is that in investigating a suspected case of rupture the greatest care should be taken to keep the bladder aseptic so that, in case there is a rent, germs cannot

spread into the tissues, and especially into the peritoneal cavity. In making the test also of injecting fluids in measured amounts and then observing whether the same amount is voided, care should be taken not to distend the bladder more than very moderately, lest a partial rupture be converted into a complete one. Abdominal exploration in suspected cases for diagnostic purposes is favored, as a rule.

Permanent Supra-pubic Fistula for Vesical Relief.—Diday, of Paris, ²¹¹_{Dec. 11, 14, '92}, has written very extensively on this subject, and has devised some apparatuses. G. Wiley Broome, of St. Louis ⁸²_{Aug. 12, '92}; D. J. Hayes, of Milwaukee, ⁶¹_{Aug. 22, '92} and W. B. Rogers, of Memphis, ⁷⁴_{Mar. 18, '92} also contribute articles advocating this procedure in suitable cases. (Since radical operations for prostatic obstruction are becoming more general, the indications for this procedure are decreasing.)

Hernia Including the Bladder-Wall.—Aue ⁸⁰¹_{Dec. 18, '92}, records a case of crural hernia in a woman in which, on operation, a glistening tumor appeared. On being cut into this proved to be composed of bladder-wall. The author collects from the literature bearing on the subject 59 cases of hernia in whose sacs a knuckle of bladder was included. Of these cases the hernia was inguinal in 43 instances, perineal in 8, obturator in 3, ventral in 2, crural in 2, and ischiatic in 1. Lejars, ⁹¹_{Jan. 18, '92}, Schoonen, ⁹¹_{Apr. 18, '92}, Demoulin, ¹⁷_{Sept. 18, '92}, and Duret, ²⁶⁸_{Mar. 18, '92} all appear in articles on this subject.

Autoplastie Experiments on the Bladder.—S. Rosenberg, ²⁰_{Nov. 18, '91}, has made such experiments on dogs. In each instance he cut out a section of bowel without disturbing its mesenteric attachment and sutured the two free bowel ends together. The bladder was then incised and the piece of resected intestine put in as a splice, its mucous-membrane side being turned in to correspond with that of the bladder. The graft took perfectly and the vesical functions were resumed. All the dogs operated on in this manner survived.

Tubercular Cystitis.—E. Desnos ⁸¹_{Jan. 22, '92} and Luys ²⁶⁶_{Mar. 18, '92} both call attention to the efficacy of instillations of corrosive-sublimate solutions as advocated by Guyon in these cases. At first the instillations are weak, about 1 to 5000. If these are well tolerated the strength is gradually increased. From two to five days is the space recommended between the applications. (For further consideration of cystitis, see medical article, vol. i, Sec. F.)

PROSTATE.

The Mechanism of Bladder Closure and of Urination, and the Physiological Offices of the Prostate.—E. Finger²⁸⁸, Sept. 19 assigns the following functions to the prostate: 1. The muscular tissue acts as a sphincter for the bladder, the seminal vesicles, and the prostatic glands, and also as an expulsor of the urine. 2. The glandular tissues appear to act as a generative organ by virtue of their secretion, and to bring about the vivification of the previously motionless spermatozoa. 3. The caput gallinaginis acts as a closer of the urethra posteriorly during coitus, and seems to have a functional connection with the acts of erection and ejaculation and with the feeling of voluptuousness.

General Articles.—G. Frank Lydston,¹⁹, May 18 in an interesting article on the etiology of prostatic hypertrophy, after reviewing the literature, draws his own conclusions. Nathan Mayer, of Hartford,²⁰⁰⁴, Apr. 19 in an article on prostatic hypertrophy, calls attention to the importance in the very early stages of the trouble of hygienic measures and exercise.

Judicious Management of the Symptoms of Prostatic Hypertrophy.—E. Hurry Fenwick,¹⁰⁷⁷, Apr. 19 in an article under this caption, in a forcible manner details the treatment which he considers adapted to the different degrees of vesical obstruction occasioned by hypertrophy of the prostate.

Thrombosis of the Prostatic Plexus.—C. W. Mansell Moulton¹⁰⁷⁷, Aug. 19 calls attention to such a case, and considers this pathological condition to be common. (See also Englisch's article on haemorrhagic infarction of the testicle, reference to which is made in this ANNUAL.) He also holds that frequently congestion in connection with this plexus is the cause of temporary symptoms of prostatic hypertrophy.

Prostatectomy.—William N. Wishard, of Indianapolis,⁵⁶, Oct., '92; Dec., '92 ²⁴⁵ contributes two instructive articles on the palliative and operative treatment of the enlarged prostate and on perineal operations on the prostate, with a brief report of a new method of removing the lateral lobes. In the first article, after reviewing the literature and the various procedures for operative relief, the author reports seventeen cases occurring in his practice, in which either the supra-pubic or the perineal methods were employed. In a number of these cases recovery, combined with a perfect restoration of the

vesical functions, ensued. Death resulted in four cases. In the second article the author favors the perineal route in cases where the deep urethra is not so much lengthened by the prostatic hypertrophy as to prevent the finger, inserted through the perineal wound, from reaching beyond the growth. Catheter measurements of the prostatic urethra, together with the rectal feel, are generally sufficient to determine the operator in making his choice as to the method of operation. Wishard has operated twelve times by the perineal route. In one of these cases, after making the perineal incision, the first two fingers of one hand were introduced into the rectum and the forefinger of the other into the perineal wound, and the offending prostatic growth shelled out by the combined action of these fingers.

G. Buckston Brown, ²,_{Mar. 11} after fully considering the question of supra-pubic prostatectomy, concludes as follows: 1. Supra-pubic prostatectomy should not be undertaken at the onset of catheter life unless regular catheterism is impossible. 2. The operation should not be undertaken as long as ordinary catheter life is tolerable. 3. If this become intolerable the operation is indicated. 4. As the result of the operation there is a fair prospect of a restoration of the vesical functions. Reginald Harrison ²,_{Mar. 11} considers the question of the restoration of the function of micturition after prostatectomy.

R. W. Stewart, of Pittsburgh, ¹⁶¹,_{June} reports two cases of prostatectomy. George E. Armstrong, of Montreal, ²⁸²,_{Mar.} reports three cases. Gilbert Barling, of Birmingham, ⁶,_{June 10} reports a case in which prostatectomy was performed twice on the same patient, the second time with complete success. H. Schmid ³³⁶,_{July 29} and Tuffier ¹⁴,_{Jan. 4} also write articles on this subject.

Von Dittel ⁵⁷,_{June 18} reports a successful case in which he removed the whole gland by his external method. The author concludes that in cases where the prostatic growth does not impinge upon the urethra his method is practicable. J. S. Pyle, of Canton, Ohio, ⁵⁹,_{Aug. 6, 1900} reports a successful case where a procedure very similar to Dittel's was adopted. W. Bruce Clarke, of London, ²,_{Dec. 17, 1900} reports success in overcoming prostatic obstruction by adopting Bottini's method of galvano-cautery.

L. Bolton Bangs, of New York, ⁹⁸,_{Apr.} relates an interesting case where great stretching of the prostatic urethra incident to a

perineal lithotrity proved to be of lasting benefit in relieving prostatic symptoms which had existed previous to the stone formation.

J. William White, of Philadelphia,⁹⁶ after thoroughly considering the present position of the surgery of prostatic hypertrophy, refers to the question of atrophy of the prostate subsequent to castration, the same being analogous to atrophy of the uterus after removal of the ovaries. The author records numerous experiments which he has made on dogs, showing that after castration the prostate in these cases loses weight. The inference is drawn from these experiments that castration might sometimes be of value in the relief of prostatic hypertrophy.

F. Rocum, of Christiania,⁸⁸⁶ in considering this same question of castration with reference to atrophy of the prostate, has made experiments on dogs and pigs, and, after satisfying himself that such atrophy does take place, has operated on two old men suffering from retention owing to great enlargement of the prostate. In the first case the prostate, which at the time of operation was the size of an orange, soon diminished greatly, and the use of the catheter became unnecessary. In the second case, which is too recent to judge of the result, and which was of long standing and very aggravated, the author reports marked diminution in the size of the prostate, and states that he will at a later date record the final result.

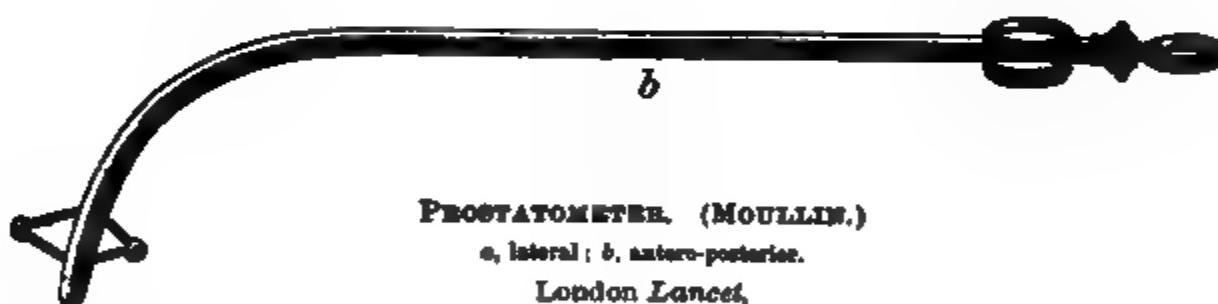
Reginald Harrison,² in considering this idea of castration, reports that he once cut the vas deferens in connection with both testicles for troublesome prostatic symptoms. The patient reported relief of symptoms after the operation.

Volianski⁵⁵¹ and Ebermann²¹ both advocate prostatic massage by digital manipulation through the rectum in cases of chronic prostatic hypertrophy, claiming that a diminution in the size of the organ results. A. Freudenberg, of Berlin,⁸⁹⁹ advocates ichthyol suppositories for the relief of prostatitis, about $\frac{1}{2}$ gramme ($7\frac{1}{4}$ grains) of ichthyol being used in each suppository.

Prostatic Concretions.—E. L. Keyes²⁴⁵ reports a case where he removed from a prostatic abscess-cavity a large number of concretions resembling raspberry-seeds in size and shape.

Malignant Disease of the Prostate.—C. M. Whitney, of Boston,⁹⁹ after reporting a case, reviews the literature on the subject in an extensive manner.

Tuberculosis of the Prostate.—Mardewell ²³⁶ states that one-third of all cases of prostatic tuberculosis give rise to no symptoms. Often the symptoms are those of catarrhal prostatitis associated with irritation of the bladder. Occasionally abscesses form, which may connect the bowel with the prostatic urethra. Tuberculosis rarely remains localized in the prostate. E. Wickham ¹⁶² and Desnos ¹⁴, both advocate a trial of the sclerogenic method of Lannelongue, which consists in the injection, into the area involved by tubercular disease, of a solution of chloride of zinc. (Mention has already been made of this process in considering the testicle.) In making these injections the approved method is to expose the prostate by means of a perineal section and then to insert the



syringe through the cut. Several small injections into the diseased area are then made.

Prostatometer.—C. Mansell Moullin, ⁶ in an article on the diagnosis of the different forms of prostatic enlargement, presents a prostatometer by means of which he claims that measurements of the prostatic urethra can be taken, and an opinion formed as to the extent of the hypertrophy.

URETERS.

Membranous Ureteritis.—Jaksch ¹¹⁴ reports a case in which the urine for a considerable period contained casts of the ureter. These casts are described as being about ten centimetres long, translucent, spiral, and ribbon-like in appearance.

F. Penrose, of London,² records a case from which a ureteral cast several inches long was passed, consisting of blood-clot and sarcomatous tissue. In this case the primary seat of the sarcoma was in the kidney.

Fistulæ.—Iversen, of Copenhagen,⁶⁷⁸ treats of this subject in an exhaustive manner. He divides such fistulæ into two groups, uretero-uterine and uretero-vaginal. Accidents at the time of childbirth account for most of the cases. Tuffier²⁶⁶ describes a class of fistulæ which persist after nephrectomy, and which are due to inflammation of the ureters associated with dilatation. For such cases removal of a part of or the whole offending ureter is advocated.

Operative Interference in Cases of Ureteritis.—James Israel,⁴ records a case where, nephrotomy having been performed for the relief of existing symptoms without any benefit, an extensive exploratory operation was undertaken, and the kidney, together with the whole ureter, exposed. The ureter, although previous, was found to be chronically thickened and two or three times its normal size, and in places almost cartilaginous. Nephrectomy was performed and a cure resulted. P. Reynier,¹⁴ reports a case in which, nephrectomy having been performed and a purulent cystic kidney removed, a purulent discharge from the ureter, associated with pyrexia, persisted. To overcome this condition the author removed the whole of the offending ureter, thus effecting a cure.

Operative Procedures in Connection with the Ureter.—A. L. Stavely, of Baltimore,⁷⁶⁴ reports two cases in which catheterism of the ureters was adopted. C. Willems⁶⁸⁴ advocates catheterization of both ureters after some vesical operations. D. Lowson, of England,² removed a stone from the ureter by way of the vagina.

Küster,²²⁶ reports a case where, a stricture in the upper part of the ureter existing, the diseased area was resected, after which the lower end of the ureter, having first been slit open vertically, was sutured to the renal pelvis. Union took place and the result of the operation was satisfactory.

Christian Fenger, of Chicago,¹⁰⁵² in an able article, records four cases of ureteral surgery. In case No. 1 a longitudinal cut three-fourths of an inch long was made into the ureter and a stone

extracted. The cut was not sutured, but it, nevertheless, speedily closed. In case No. 2, in searching for stone, the ureter was incised and a probe passed down into the bladder. No obstruction being found, the wound into the ureter was closed by sutures. No fistula resulted. Case No. 3 was one of movable kidney, associated with hydronephrosis, caused by a valvular obstruction at the junction of the pelvis and the ureter. The valve was divided transversely and the ends of the incision brought together by a suture. A bougie was inserted through the exploratory wound, into the pelvis of the kidney, and down the ureter beyond the point of obstruction, and kept there for two days. The movable kidney was secured in place by nephorrhaphy. Patient recovered without fistula. Case No. 4 was one of traumatic stricture of the ureter causing intermittent hydronephrosis. After laying open the pelvis of the kidney and locating the stricture by passing a probe down the ureter, a longitudinal incision was made into the ureter, through the whole length of the stricture, and extending upward to the pelvis. Now, imitating the Heinecke-Mikulicz procedure in cases of stenosis of the pylorus, the incised ureter was brought up to and sutured to the renal pelvis. The result of the operation was satisfactory, no fistula resulting.

W. Van Hook, of Chicago,⁶¹ experimentally cut transversely through the ureter of a dog. He then sutured the end of the lower portion and made a longitudinal cut in its side. Through this longitudinal cut the upper end was invaginated, after having been slit up longitudinally, and secured by sutures. A fold of omentum was then wrapped about the splice. The dog recovered, with no ill effects. On being killed, later, good union with no diminution in the calibre of the ureter was found.

Grafting the Ureter to the Bowel.—Morestin¹⁰⁸ has made numerous experiments on dogs, with bad results. Tuffier,⁷ in commenting on Morestin's experiments, states that they were necessarily bad, as they did not simulate natural conditions. If ascending infection is to be prevented, the vesico-ureteral sphincter should be preserved. If this sphincter were preserved, there is no reason why such grafts should not be successful. In order to be successful it would be better to graft the bladder-wall to the bowel, thus preserving intact the ureteral orifice.

KIDNEY.

Anuria.—Cabot, of Boston,⁹⁹ reports a case in which, total suppression having existed for seven days, an exploratory operation was performed, resulting in the dislodgment of a calculus. The result was an abundant flow of urine and recovery of the patient. In this case it was thought by the author that there was but one functioning kidney.

Fraser and Parkin, of England,⁶ report a case of complete anuria in a woman of 74 years. The anuria having lasted for five days, and the few localized symptoms which the case presented being referred to the left kidney, left-sided nephrotomy was performed and an organized obstruction of the upper end of the ureter discovered. The case was immediately relieved by the operation and speedily recovered. In this case it was thought that the right kidney was useless. Ferguson, of Troy,⁴⁰ reports a case of reflex anuria lasting about two days after nephrectomy. The case recovered. James Bell, of Montreal,²⁸² reports a case of complete reflex anuria lasting fifty-four hours after a nephrotomy. The patient recovered.

S. Alexander, of New York,²⁴⁵ reports an interesting case of fibrinous cast of the pelvis and calices of the kidney passed spontaneously in the urine.

General Articles on Renal Surgery.—James Israel⁴¹ states that a distinction should be made between primary nephrectomy and nephrectomy secondary to nephrotomy in cases of hydro-nephrosis and pyonephrosis. In such instances primary nephrectomy in his hands has been much more successful than the secondary operation. The same author⁴¹ reports 68 kidney operations, undertaken by himself on 59 subjects, with 11 deaths. Among these cases are 11 nephrotomies, with 1 death; 27 primary nephrectomies, with 3 deaths; 4 secondary nephrectomies, with 3 deaths; and 5 nephrolithotomies, with 2 deaths. Tuffier³⁶³ reports 58 operations performed upon the kidney, with a mortality of 10.8 per cent. Of these operations there were 36 nephorrhaphies, with excellent results; 10 nephrotomies, with 2 deaths, and 10 lumbar nephrectomies, with 3 deaths.

Henry Morris², classifies the 23 nephrectomies which he has performed as follows: (a) solid tumors, 5 cases, 2 deaths; (b) hydro-nephrosis and hydronephrotic cysts, 6 cases, no deaths; (c) calcu-

lous affections, chiefly pyonephrosis, 7 cases, 2 deaths; (*d*) tuberculous disease, 5 cases, 3 deaths. The method of operating—*i.e.*, whether abdominal or lumbar—must depend on the nature of the disease. The mortality varies more according to the nature of the disease than the method of operating. The author gives a history of each of the 23 cases. Of special interest in this list are 1 in which a growth, primary in the supra-renal capsule, had invaded the adjoining kidney; 1 of hydronephrosis, in which convulsive seizures were the chief clinical symptom; and 1 of calculus in both kidneys, where nephrectomy on the right side was finally undertaken, after nephrotomies in connection with both kidneys had been performed. Recovery followed the last operation in this case. Page, of Newcastle-on-Tyne,⁶ and M. H. Richardson, of Boston,¹⁹ both report four successful cases of nephrectomy. Richardson prefers the abdominal route.

Movable Kidney.—C. Neumann, of Berlin,²³ has collected 283 cases of nephorrhaphy, of which 9 are personal, for movable kidney. Of these, 65.32 per cent. were cured, 10.36 per cent. were improved, 22.07 per cent. were failures, and 1.82 per cent. were fatal. The author concludes that this operation should be undertaken in all cases of movable kidney where mechanical appliances have failed, in order to guard against later pathological changes in the organ, which occur after a time if the proper position is not maintained.

Zatti,⁵⁸⁹ as a result of numerous experiments with nephorrhaphy, reaches the following conclusions: 1. The fibrous capsule of the kidney is quite capable of undergoing inflammatory neof ormation, such as is required for the production of adhesions. 2. The adhesions formed are much more extensive if the capsule is in part removed than if it is left intact, but the most successful adhesive changes are produced by leaving the capsule *in situ*, and applying either nitrate of silver or chloride of zinc. Under these conditions the renal substance itself undergoes no alteration whatever. 3. The removal of the perirenal fat helps also to secure a firm adhesion of the organ to the lumbar region. The author, therefore, advocates, especially in cases where there is a question as to the soundness of the second kidney, stripping the organ of its lax perirenal fat and cauterizing the capsule with nitrate of silver or chloride of zinc before fixing it in position. George M. Ede-

bohls, of New York,⁵ and D. W. Graham, of Chicago,⁴⁵¹ both present articles on this subject, the former reporting twelve and the latter four personal cases of nephorrhaphy. Albarran¹⁴ reports a case of strangulation of a movable kidney. The author cut down upon the kidney by means of a lumbar incision and replaced the organ. A perfect cure ensued. Kendal Franks, of Dublin,¹⁶ reports a case of true floating kidney.

Abscess.—E. A. McGannon, of Canada,²⁸² reports an interesting case where pus, the source of which was from the kidney, pointed both above and below Poupart's ligament, simulating a psoas abscess.

Clement Lucas²² reports a case where kidney-pus found vent into the bowel and probably also into the thoracic cavity, as pleurisy existed until the offending kidney was removed, after which the bowel-fistula also, as is usual, closed. Hans Doerfler³⁴ also reports a case of renal suppuration associated with bowel-fistula. C. K. Briddon⁹⁶ reports a case of renal abscess adherent to the diaphragm, to reach which it was necessary to resect the last two ribs.

Hydatid Cysts.—Pollossen, of Lyons,²¹¹ reports a case of this nature which pointed in the loin. An incision was finally made into the tumor, thus demonstrating its character. Later on, a fistula persisting, an operation was undertaken and the contents of the sac, together with a portion of its wall, was removed. Kümmell, of Hamburg,⁴¹ reports such a case in which he dissected out the sac, leaving the sound portion of the kidney intact. Burckhardt, of Stuttgart,¹⁸⁸ reports one also, in which the whole mother-cyst was removed without extirpating the kidney.

Traumatism.—Bobroff³³⁶ reports three personal cases of subcutaneous rupture of the kidney, in one of which a cure was effected by nephrectomy. In such cases Bobroff concludes that if the life of the patient is threatened by haemorrhage a laparotomy should be performed and the renal vessels ligatured, experiments on animals having demonstrated to his satisfaction that neither renal necrosis nor suppuration follows such a procedure. If suppuration ensue after the haemorrhage, then nephrectomy or nephrotomy with drainage is advocated. Yvanoff,¹⁶⁴ after reciting an interesting case of apparent subcutaneous rupture of the kidney which got well under expectant treatment,

advocates such measures in these cases. Wagner,³⁰¹ ~~184, 185~~ reports 11 cases of kidney traumatisms, with 8 recoveries and 3 deaths, expectant treatment having been employed.

Resection of the Kidney.—Kümmell, of Hamburg, ⁴¹ ~~185~~ reports a number of cases in which he removed portions of the kidney. The edges of the renal wound were brought into apposition by sutures, union resulting.

Malignant Disease.—James Israel, ⁴ ~~18, 19~~ from a study of statistics, finds a mortality of 56 per cent. as the result of nephrectomy for malignant disease. This percentage does not take into account deaths resulting from a recurrence of the disease. He has performed nephrectomy 11 times for malignant disease, with only 2 deaths from the operation. Of the remaining 9 cases, 1 died in six months and 1 in thirteen months from recurrence. The remaining 7 cases do not at present show signs of recurrence. Of these, 1, a cancer, was operated on five and a half years ago, and 1, a sarcoma, four years and two months ago.

Marie B. Werner, of Philadelphia, ⁸⁰ ~~186~~ reports the successful removal by nephrectomy of an 8-pound sarcoma from a child 2 years old. R. Abbe, of New York, ⁹³ ~~186~~ reports the removal by the same operation of a 7½-pound sarcoma from a child aged 1 year and 2 weeks. At the time of the report, one week after the operation, the child was doing well. This tumor was of very rapid growth, as the mother had first noticed it seven weeks before the operation. H. J. Ilott and W. J. Walsham, of London, ² ~~187~~ removed from a child 10 months old a large sarcomatous kidney, with perfect immediate results. The growth recurred, however, inside of a year. In these three cases the tumor was removed by means of abdominal incision. G. H. Hume, of Newcastle-on-Tyne, ⁶ ~~188~~ and Burckhardt, of Stuttgart, ¹³³ ~~189~~ each report a successful nephrectomy for malignant disease in adults.

Glycerin in Nephrolithiasis.—Hermann, of Prague, ⁸⁸ ~~189, 190~~ praises highly the internal employment of glycerin in nephrolithiasis. Fifty to 100 grammes (1½ to 3½ ounces) of glycerin are given at once or in divided doses. The author is of the opinion that uric-acid concretions can in this way be disintegrated and discharged.

Reginald Harrison¹⁰⁷⁷ ~~Dec. 7, 1892~~ prescribes a teaspoonful of pulvis

magnes. et boro-citratis in a pint ($\frac{1}{2}$ litre) of hot water on rising and in the afternoon, for cases of renal colic which do not admit of an operation. The author considers that such a treatment exerts some solvent action on calculi, thus favoring their elimination.

Tuberculosis.—Important articles on this subject have appeared from the pens of Tuffier,²⁰⁴⁵ Vigneron, ¹⁰⁰_{June 24, July 1}, Facklam, of Rostock, ²²⁶_{B. 45, p. 716} and Heydenreich, of Nancy. ³_{July 6}. In these articles the general opinions of the authors seem to be against nephrotomy as a means of relief except possibly in a few selected cases. Facklam, out of 36 cases of nephrotomy, reports a general mortality of 33.33 per cent. and a mortality from the operation of 13.88 per cent. In 16 of these cases, no improvement following the nephrotomy, nephrectomy was performed. Of the 8 remaining patients who recovered, 4 only were cured, and of these cures but 1 is well established. Vigneron reports 54 of these operations with a general mortality of 38.18 per cent. and an operative mortality of 12.72 per cent. As regards nephrectomy where the abdominal route was employed, Tuffier reports 11 cases with a mortality of 36.3 per cent., Facklam 13 cases with a mortality of 30 per cent., and Vigneron 19 cases with a mortality of 36.84 per cent. Nephrectomy by the abdominal route seems to be generally condemned. Where the lumbar route was employed Facklam reports 75 cases with a mortality of 28 per cent., Tuffier 46 cases with a mortality of 28.2 per cent., and Vigneron 85 cases, 65 of which were primary nephrectomies with a mortality of 40 per cent., and 20 of them secondary with a mortality of 35 per cent. Heydenreich advocates in these cases nephrectomy "*sous capsulaire*," which signifies a shelling out of the kidney-substance from the capsule, as in many cases the capsule is much thickened and securely bound down by perirenal inflammatory adhesions. Tuffier ²⁰⁶_{July} describes two different forms of early renal tuberculosis,—a painful and an hæmorrhagic form. Attention is called to two cases of the first form, in which the only symptoms were those of nephritic colic. The urine was clear and no tumor of the kidney could be felt. Tubercl bacilli were, however, found in the urine. In the second form bloody urine was the only clinical symptom. Cystoscopic examination showed that the blood was of renal origin.

Ollier, ²¹¹_{M. 10}, in an article on nephrectomy "*sous capsulaire*" (the method just described), states that he has employed this

procedure in suppurative renal conditions for the past ten years, and has found it most satisfactory and less fatal than the complete removal.

Diuretin.—E. L. Keyes, ⁸⁰ as a result of further experiments with this drug, concludes that it is not capable of averting urinary fever.

SYPHILIS.

BY J. WILLIAM WHITE, M.D.,
AND
WM. HENRY FURNESS, 3D, M.D.,
PHILADELPHIA.

HISTORICAL.

Jelks ⁶¹ gives a summary of the conclusions reached in 1890 by Buret, and even earlier by Hamonic, to the effect that syphilis was well known as far back, at least, as 1921 B.C. According to the Bible, Abraham and his wife, Sara, a woman of great beauty, visited the court of Pharaoh.. Pharaoh appropriated Abraham's wife, and thereupon a great plague was visited upon him and his wives and all of his officers. Pharaoh then returned Abraham's wife to him, and with reproaches dismissed him. Similar disease followed Sara's sojourn in the court of Abimelech, and "the Lord closed the womb of all women of the house of Abimelech on account of Sara, the wife of Abraham." Sara was for a long time sterile, but late in life became pregnant, which fact Hamonic ²¹⁰⁰ thinks must have been due to syphilis, and not to any organic disease; outside of syphilis there is no other disease of genital origin which could account for it. Buret ²¹⁰¹ aims to show that the Psalms are David's groans over osteoscopic pains, ulcerations, and syphilitic gummata which he had contracted from Uriah's wife. This occurred about 1034 B.C. It is also worthy of note that Moses adopted most rigorous methods of exterminating that disease, which the Israelites contracted from the Moabites at the worship of Baal Peor, which disease was undoubtedly syphilis. Moses adopted, as a radical means of subduing it, the slaughter of twenty-four thousand men and women thus afflicted. But why search in records as modern as the Bible for the origin of syphilis ? Syphilis and mercurial treatment are recorded in Chinese history as far back as 2700 B.C. The disease is as old as prostitution, and prostitution is as old as the human race. In the bones of the

Incas and Mound-Builders, and wherever the bones of the buried races of the past are found, we can see the exostoses on the superciliary arches, and on the frontal and parietal bones, which are the stamps of syphilis. The comparatively short but highly-valuable chapter devoted to the investigation of the American origin of syphilis in Buret's book is enlarged ⁷⁹ by the addition of certain ordinances issued by the King of France in March, 1493, to the effect that "all who are sick with the 'large verole' must leave the city of Paris; strangers must return to their homes." Some doubt, however, having been cast upon the date of this ordinance, Buret cites from the records of the hospital Du Midi, proving that the venereal disease was classed among those encountered in the year 1495, one year before Columbus returned from the second expedition, when the accusation of introducing syphilis to Europe arose. In this same article Buret has gathered a mass of additional evidence to prove that the disease was known before that date, and to it the student of this branch must be referred. Morgan ⁸¹ may also be recommended for an exhaustive review of the subject, mainly devoted to the proofs of syphilis in the indigenous races of both Americas. His final words are: "I believe syphilis is as old as our race. As to its origin, or whence it came, the silent page of history can only tell."

The history of the treatment of syphilis during the fifteenth and sixteenth centuries is related by Kiernan,⁷⁹ who states that, although America is often charged with being the earliest home of the disease, there are ample proofs that it existed long before the discovery of that continent. The early Egyptian priest-physicians describe a venereal disease, then known as uxedu, which, from its eye, ear, and skin symptoms, closely resembles syphilis. In A.D. 1484 an epidemic of "galloping syphilis" originated in Spain and rapidly spread throughout Europe; this new disease was ascribed by the astrologers to the conjunction of Mars and Saturn in the sign of the Virgin, and the religious saw in it a divine punishment for blasphemy. This "malignant leprosy" was contracted, according to Michael Scott, by intercourse with a leprous woman, and the constitutional disease was preceded by an ulcer on the penis. It was also noted by Gilbert that these penile ulcers were much more frequent after the Crusades. Mercury was energetically used, both locally and internally, during the fifteenth

century, but produced such dire results that the Galenical school protested. In 1514 Fernandez de Oviedo brought from San Domingo an infallible remedy against syphilis,—guaiac-wood. It was to be taken in the form of a decoction of the chips of guaiac. This treatment was in use till the close of the sixteenth century. About this time the furibund character of syphilis began to disappear, and the disease became otherwise modified. Massa's description of it shows that gummatous and osseous caries, now considered tertiary lesions, occurred during the secondary or eruptive stage. Manardi calls attention to the induration of the chancre.

SYPHILITIC VIRUS.

Although Neumann discredits, thus far, all alleged micro-organisms of syphilis, he is firm in the belief that there is such a micro-organism.²⁸³ Aug. 29, 1895, 11. The separate phases of the disease can be paralleled with the biology of such an organism. There is, first, entrance of the virus at some abrasion, without local or general reaction; after a time, the virus has become sufficiently strengthened at the point of inoculation to produce a local pathological change, but the bulk of the blood and fluids of the body is not yet permeated, and there are no general symptoms. The growth of the virus and its metabolic products still continues, however, and, after a further lapse of time, there is an indication of complete general infection, which persists for a number of years, manifesting itself by accumulations of the virus and more pronounced local irritation, especially at points which are exposed to mechanical or chemical injuries. At last the tertiary stage is reached, when, by its own metabolic products, the virus is hindered in its further advance and gradually dies out, but leaves the tissues, which it has specifically changed, with an increased irritability and a tendency to pathological new growth.

The essential syphilitic virus is still unknown, but indubitable data enable us to trace its wanderings from the point of inoculation to the diverse organs of the body. We further see how, in the continued course of the disease, there are larger deposits of the poison, especially in the skin and certain mucous membranes, where infiltrations peculiar to syphilis set in, which, once established, possess an extraordinary persistence, and years after, even when all outward manifestations have vanished, may be micro-

scopically detected in the deeper tissue-layers, and, either through some external irritation or even spontaneously, may start into new proliferation, and thereby present the appearance of frequent recurrences of the disease. We can now comprehend that the products of disintegration of these specific infiltrations contain the syphilitic virus in greater masses, and that they may be especially adapted to transmit the disease; but these products are not the only transmitters of the contagium. The living cellular elements and tissue-fluids of this specific infiltration possess this quality to a high degree. It is not unusual for syphilis to be conveyed by a kiss, even when the syphilitic infiltration on the lips has been invisible for years, but from which the outer cornified epithelial covering has been removed either by smoking or by some mechanical cause. [This is an extraordinary statement, and is certainly untrue, if "years" be actually meant.—J. W. W.] Ricord for a long time insisted that the disintegrating products of the primary stage alone possessed an infecting quality, but finally he and his school acknowledged the force of numberless experiments conducted by such men as Wallace, Waller, Bärensprung, Lindwurm, and many others; so that to-day the infectiousness of secondary syphilis stands as a universally-acknowledged fact. Neumann believes that it is not yet clearly proved that the contagium is still virulent in the tertiary stage. Positive results, here and there, are confronted by numerous negative results arising from inoculations and observations. [The positive results are very few and very doubtful. The preponderance of proof shows that, almost without exception, tertiary syphilis is non-inoculable and intransmissible.—J. W. W.] On the whole, it is safe to say that the contagiousness of syphilis, at that period, and, indeed, throughout its entire course, stands in close relation to the intensity of the whole process. In the tertiary stage the disease has, for the most part, completely changed its character, and appears more like a profound disturbance of nutrition of the entire organism; the tissues have acquired an increased irritability and a tendency, under irritation of any sort, to react in the shape of peculiar infiltrations or even of gummata. The syphilitic virus as such has, in the mean time, by its own metabolic products undergone a decided weakening, or else it has, indeed, wholly disappeared; and we must not be surprised if in many cases, at that stage, we fail to find any power of infection.

This rule does not apply, however, to those cases in which gum-mata form early in the disease, and which arise, in all probability, from some severe pre-existing ailment, such as tuberculosis or nephritis. It is not surprising that these gummata display a virulence not to be found in similar products of late syphilis.

The products of disintegration are not the only vehicles for the syphilitic virus. First, there is the blood, which induces absorption of the virus throughout the whole organism. Numerous experiments have been made with inoculations of infected blood, and, despite the fact that the attempts have not been uniformly positive, there can be no doubt, under certain circumstances, that it possesses infectious quality. Second, with regard to the spermatic fluid, we see constant proof that it can convey the disease to the offspring; but the question whether the free seminal fluid can infect the wife is not yet clearly proved. The strength of the virus contained in the spermatozoa, or ova, depends also upon the general trend of the disease, in so far as the hereditary danger constantly diminishes with the course of the disease. In the tertiary stage, healthy children, as a rule, are born even from patients who are suffering from gummatous affection of the testicles. At the same time the sperma virile is the only physiological secretion to which we can ascribe the quality of virulence. [And only then by transmission to offspring.—J. W. W.] In the cases of urine, sweat, tears, saliva, milk, etc., there can be no infection unless they are tainted with syphilitic product. Voos was able in one instance to infect with syphilis a 16-year-old girl by a subcutaneous injection of syphilitic milk. What is true of physiological secretions holds good with the products of non-syphilitic catarrhal or inflammatory diseases in syphilitic individuals in whom the pus of gonorrhœa, of acne, of vaccination, and of eczema have no syphilitic infecting power unless mixed with blood or other infecting particles of syphilis. We recognize but two ways of inoculation: first, the transmission at the time of procreation by the sperma virile or by the ovum (*hereditaria*); and, secondly, transmission by direct introduction of the syphilitic virus (*syphilis acquisita*). To this latter inoculation on any portion of the human body the race is susceptible. The syphilitic individual is the sole possessor of an unenviable immunity to infection; re-infection is of the very rarest, albeit here and there cases have been reported. [This is hardly to be put

so absolutely. In a letter to me, written some years ago, Dr. Fessenden Otis combats the view that syphilis affords a protection against subsequent attacks equal and similar to that given by the exanthemata. He says: "But the degree of protection afforded by an attack of syphilis against subsequent re-infection is by no means well settled. The published instances of re-infection of syphilis are much more numerous than of re-infection after the acute exanthemata; and when we consider the frequent epidemic prevalence, and the greater liability to infection through the atmosphere, through somites, and through actual contact in the latter diseases, the contrast becomes so great as to cast reasonable doubt upon the claim of a protective influence for syphilis. What physician in his own experience has been able to record a dozen cases of the re-infection of variola? And yet Diday and Gascozen each report twenty cases of the re-infection of syphilis in their own experience. Koebner reports nearly fifty cases. Follin, Bouley, Caspary, Hutchinson, Ricord, and others have also reported well-authenticated cases. We have easy access to more than a hundred published instances of the re-infection of syphilis, and *all quite accidental*. We have not, as far as I am aware, a single record of systematic, carefully-conducted experiments bearing on this point."—J. W. W.]

Mauriac,³⁶⁰ on the other hand, maintains that all secreting lesions of syphilis contain the contagium even when the lesions, according to their intrinsic character and date of appearance, clearly belong to the tertiary class. The virulence, however, he acknowledges, seems to diminish considerably in the periods remote from the constitutional invasion. It is generally conceded that an ordinarily severe case of syphilis is rendered almost innocuous as regards contagion and transmission to posterity toward the end of three, or, better still, of four years of careful treatment. Mauriac, nevertheless, says that he has seen marked exceptions to this rule, even after very mild cases of syphilis; he relates one case of infection occurring nine and a half years after the primary lesion; in another, four years elapsed. The close relationship between the virulence, as regards contagion and heredity, and the precocious, papular eruptions, and especially the mucous patches, seems to be clearly established; but there are virulent forms which can be explained only on the assumption that foci so small and transitory as to

escape the notice of the most observant physician and patient exist, and only make themselves known when they are the exits for contagion, or when the patient, thinking himself cured, has syphilitic offspring. Mauriac is inclined to believe that the apparently benign cases of syphilis are in reality more to be dreaded in marital relations than cases of a malignant character. It is impossible to determine with accuracy the time when it is safe for a syphilitic to marry without fear of infecting his wife or offspring, and we must strike an average, disregarding the exceptions.

Cordwent² is of the opinion that the syphilitic taint never dies, but that it modifies the type of every subsequent disease, and that, therefore, a syphilitic man should never be permitted to beget children. He has seen cases of hereditary infection follow eight years after the father had chancre. But cases have been known, continues Mauriac, in the article just quoted, where the husband, in the height of the disease, has infected neither his wife nor his children, and to counterbalance these are cases of contagion occurring nine and a half years after the primary infection. In general, however, it is safe to say that syphilis, energetically and systematically combated, loses its virulence at the expiration of three and a half to four years. [This is so important and so well demonstrated a fact that it deserves more emphasis as contradicting the unfounded opinion of Cordwent above quoted.—J. W. W.] Unfortunately, our knowledge has not yet advanced to such a point that it is possible to prognose from the appearance of a chancre what degree of severity the disease will attain. In general, however, we may prognosticate severe tertiary symptoms from a phagedenic, obstinate chancre, and that a mild, erythematous, superficial chancre will be attended by mild but moderately-protracted secondaries. It is not uncommon for severe lesions of the brain and spinal cord, in preference to other organs, to succeed a mild secondary stage. In the severe forms of chancre it often happens that the secondary stage is entirely omitted, and the patient passes at once into tertiary symptoms. [Precocious or malignant syphilis is, fortunately, not so common, even after severe chancres, as the use of the word "often" would seem to indicate.—J. W. W.] The induration of the initial sclerosis is not by any means as important a guide to prognosis as the ulceration; it apparently depends more upon local conditions than a general predisposition. Likewise, strange as it may seem,

no direct correlation appears to exist between it and the lymphatic engorgement. In the secondary stage, Mauriac has noticed a marked relation between glossopathies, palmar and plantar affections, and also a pronounced affinity between papulo-syphiloderms and syphilitic iritis, most often to be observed from the fourth to the twelfth month. Secondary syphilis is not always limited to the skin and mucous membrane ; the infection may extend to the bones and viscera so soon after the appearance of the chancre as to class the resulting lesion, without a shadow of doubt, among the secondary manifestations. This, however, is of rare occurrence. Periostoses and exostoses may develop at any part of the osseous system within the first few days of infection, but they do not of necessity presage a severe onset of tertiary lesions.

There is also a form of neoplasm which may appear within the first few days after infection, and which Mauriac calls "*erythème nouveau syphilitique*." These small tumors, situated in the cellular subcutaneous tissue, may appear almost immediately after the primary lesion in the most virulent period, usually accompanied by fever and rheumatoid pains, and undergo resolution spontaneously. Other forms of subcutaneous lesion are also met with in the secondary stages in the shape of plaques,—nodosities which sometimes suppurate, but rarely become malignant.

Sclerosis of the corpora cavernosa is very rarely syphilitic. Affections of the penis and the testicle are certainly manifestations of secondary syphilis, according to their chronology. Sarcocoele has been observed by Vidal de Cassis as early as the fiftieth day after infection. Mauriac says that he himself has seen it occur in the fourth month, and also as late as the twentieth year, after infection. [“Sarcocoele” confuses the epididymitis of the secondary stage with the connective-tissue sclerosis and gumma of the later periods. Such observations as the above are of no value.—J. W. W.] Affections of the testicle might well be classed as an intermediary manifestation. According to topography, it is tertiary ; according to time of appearance, it is secondary.

The kidneys may be attacked at any period of syphilis ; if affected in the secondary stage, the symptoms are identical with those seen in ordinary subacute and chronic Bright's disease. The nephropathy occurring late in the disease consists of processes essentially tertiary,—namely, sclerosis, atrophy, and cirrhosis.

No rule can be stated with regard to the determination of syphilis to the nervous system. Whether a lesion in this system is truly secondary or tertiary is not determinable, such lesions occurring as vehemently in the early months of the constitutional disease as in the later years. The brain, however, is more often attacked than the spinal cord in the beginning of the disease, and paralysis, especially aphasia and hemiplegia, is more frequent than convulsive symptoms. The determination of syphilis to the central nervous system in nowise modifies any other symptom of the disease, and is not in any degree dependent upon any other symptom.

From a study of venereal diseases in the extreme Orient, Michaut ⁶⁷ _{Mar. 20, May 26}, ²⁰² has observed that in those countries where opiomania and pederasty exist syphilis is of much more virulent character than elsewhere. Whether it is that the human system is, in general, run down by the opium, or whether it is that the course of the syphilis is aggravated by being of an extra-genital origin, it is hard to say; it is, nevertheless, a fact that where opiomania and pederasty are followed by syphilis the disease is always of a malignant type,—malignant even when transferred to those unaddicted to opium or pederasty. A case of syphilis contracted in Indo-China by a European is almost sure to be of most virulent type, and often ends fatally in a short time; whereas, in Japan, where pederasty is unknown, syphilis is of the mildest character, rarely going further than an abortive chancre, slight glandular enlargement, and roseola,—a few mucous patches and nothing further. It appears from these facts that syphilis acquired in commerce between persons of the same sex is of extraordinary virulence.

[The tendency of some writers to dogmatize and classify on scanty grounds is well shown here. One would think the obvious explanation of the fact (if it be a fact, which I doubt) would lie in the character, social condition, and presumably neglected health of the persons spoken of; usually degraded, almost always neurotic, and invariably depressed and melancholic.—J. W. W.]

The idea that syphilis is caused by a micro-organism in the blood dates from a period long before the names bacillus or bacterium, as applied to micro-organisms, were thought of or known. Buret, ⁴⁷⁹ _{Oct. 18} in an interesting article on the subject, quotes from Martin Lister ²¹⁰² ₁₆₆₄ that "Syphilis is engendered purely and exclusively from the iguana, a species of lizard abounding in the wilds

of America." This random theory, says Buret, was received by the scientific world with the indifference that it deserved. Nevertheless, it was again revived half a century later by Ballay, who gave the method of observing the germs of syphilis to be found in the iguana, which he called the "*virus venerien*," in an infusion of the lizard placed under a microscope. Ballay further adds that this theory is supported by the fact that mercury, which is a deadly poison to all insect life, is the only good cure for syphilis. Even before Martin Lister's and Ballay's observations on the iguana, a Hollander named Etienne Blankard ²¹⁰³₁₆₆₂ made the statement that in the human semen and in the mucus of the vagina were certain little venomous beasts, which not only attacked the genitals, but also entered the blood and corrupted it.

O'Hara ²_{ju., ss} believes that the micro-organisms of syphilis are carried from the point of inoculation through the lymphatic ducts to the inguinal glands, and, increasing there, are carried into the large venous circulation. The micro-organisms of indurated chancre and chancroid he thinks are one and the same. The absence of secondary symptoms in cases of soft chancre is due to the breaking down and suppuration of the inguinal glands, which give ready egress to the pent-up virus, which, on the other hand, is prevented from entering the general circulation, owing to the blocking up of the lymphatic ducts by the necessary inflammatory thickening surrounding the inguinal region. Acting on this theory, he induced suppuration by means of a seton of iodoform gauze passed deeply through the inguinal region, in cases of true Hunterian chancre accompanied by indolent enlargement of the inguinal glands. He claims for this method satisfactory results in twelve cases treated by him.

Currier, ²⁴⁵_{Apr.} incited by Lustgarten's publications on the bacillus of syphilis, followed the latter's method to the letter, but failed to detect any micro-organisms exclusively syphilitic. In stained sections of initial lesions, four syphilitic papules, two mucous patches, two rupial eruptions, and two gummata, he found only the ordinary saprophytic bacteria. A similar result was reached in cultures made from the pus and blood of syphilitic lesions. The *staphylococcus pyogeneus aureus* and *albus* were the only micro-organisms observed after numerous attempts. Sabouraud ¹⁰²⁹₁₈₈₉ likewise failed to obtain any results whatever from Lust-

garten's method. In all, he examined fifty-one specimens of syphilitic lesions, but did not observe Lustgarten's bacillus or anything in the slightest degree resembling it:

Neumann²⁸⁸ has made extensive experiments with a view to ascertain whether or not the lower animals can be syphilized, and concludes, after repeated failures, that we know of no authentic case; an attempted transmission of the disease has never yet, in a really convincing way, succeeded, and it is extremely improbable that it ever will succeed. Hunter, Velpeau, Ricord, Fournier, and many others have come to the same conclusion. Ulcers of chancrous appearance, it is true, have followed inoculations of animals with syphilitic virus, but constitutional symptoms do not follow the sore; and re-inoculation from the ulcer into man has failed to produce syphilis.

Lydston⁷⁷⁹ describes a disease in the lower animals known as the *dourine*, *maladie de coït*, or *syphilis equine*. In many ways this disease closely resembles syphilis, and has been supposed to be a derivative of syphilis through sexual perversion. This, however, has never been proved. Saint Cyr²⁸⁷ says, that although syphilis and the *dourine* present strong points of similarity, being both general diseases habitually contracted during sexual congress, nevertheless they are absolutely distinct.

DIAGNOSIS.

Bulkley,⁴⁶² in a few practical hints on the diagnosis of syphilis, strongly cautions us against excluding that disease from a given set of skin lesions because some, or even the greater part, of these lesions do not present the characteristics of syphilis. In his records of 300 cases he finds no less than 23 well-recognized affections of the skin associated with syphilis. Even the absence of itching is not to be depended upon as an indication of syphilis: he has known of rapidly-developing macular and papular syphilides which caused violent itching. On the other hand, in a patient with a syphilitic eruption there may be itching due to another cause, namely, eczema or scabies. Bulkley, nevertheless, does not wish to convey the idea that syphilis is not to be diagnosed unless there are clear proofs of primary infection and all the subsequent symptoms. He says that, on the one hand, all lesions in children of syphilitic parents must not be considered syphilitic, and, on the

other, in dealing with children, syphilis is not to be excluded as a possibility simply because we cannot determine whence the poison was derived; extra-genital chancre is by no means an unknown thing in childhood.

McMurray²⁶⁷ details a case of tubercular syphilis bearing so close a resemblance to tubercular leprosy that the patient, while undergoing antisyphilitic treatment, was arrested and confined in a leper hospital. The woman had a typical "facies syphilitica leontiasis," as described by Goutard; the trunk was free from lesions, but there were numerous typical tubercular syphilides scattered over the extremities, especially on the extensor surfaces of the forearms. Analgesia and anaesthesia were present over all the spots, and also in the apparently normal surrounding skin, especially on the dorsal surface of both metacarpi. At the end of five weeks of specific treatment she was released from the leper hospital greatly improved. McMurray goes on to state that, according to Fournier, analgesia and anaesthesia are quite common in syphilis, and that their distribution may be general or local; if disturbances of sensation are present at all, they are most frequently found on the dorsal surface of the metacarpi.

The similarity of the eruptions of syphilis and the first stage of small-pox is mentioned by Hutchinson²⁶⁸ as a frequent cause of error, especially during an epidemic of the latter. He mentions the case of a man, in his own practice, who, two and a half years after he had been apparently cured of syphilis, entered a hospital to be treated for fissure of the rectum; ten days after admission an eruption appeared upon his body, accompanied by a rise of temperature. This was diagnosed as small-pox and syphilis combined. While, however, the eruption was still out, and there were two gray ulcers on his tonsils, he was vaccinated on both arms, both vaccinations being successful. Hutchinson doubted the diagnosis of small-pox, and on examination of the patient's genitals became convinced that he was dealing with a case of recent syphilis, or rather a case of re-infection; although there had been small-pox in the hospital, the subsequent successful vaccination appears to show that the patient had not taken it.

Recognition of the cicatrices of syphilis is necessarily an important factor in diagnosis even years after the virulence of the disease has subsided. According to Hyde,²⁴⁵ the cicatrices of the

scalp are roughly of two classes—the large single scars and the small multiple scars. The former are rarely pigmented, destitute of hair, their surfaces smooth or scaling ; they are usually composite ; that is, a small depressed scar is contained within a depression ; their usual seat is on the top of the head, near the vertex. They usually follow lues of long duration. A variation of this form is the dumb-bell-shaped cicatrix situated on the upper part of the forehead ; it is scaly and hairless, with patches of hyperæmia. The small multiple cicatrices rarely exceed six or ten in number, varying in size. They are smooth, sharply-defined, purplish, sunken, and semilunar in shape. The complement of the circle is filled out by a shallow, clean-cut ulcer, with or without a crust. Perianal and likewise extra-genital chancres, in the great majority of cases, leave no scar unless from irritative or traumatic accidents. A chancre at the meatus urinarius, however, is an exception ; a scar almost always results there, due to constant irritation by the urine.

Scars are much more frequently observed on the lower than on the upper extremities, and on the anterior or more exposed surfaces of the legs. In almost all doubtful cases, the key to the diagnosis is not so much in the pigment actually present as in that which has been present. A wholly decolorized scar on the leg means a previous infection of four to eight years, and a healing of the precedent ulcer between two and four years previously. Scars decolorize a little more rapidly in fair-skinned men and women than in others. The slow, progressive clearing up in color is characteristic of syphilitic scars, while, as regards coloration, eczematovaricose scars remain stationary.

Bossart¹⁰⁸⁸ _{July 22} warns us from placing reliance upon scars of an old, inguinal adenitis, in making a retrospective diagnosis of syphilis, because he has himself seen two cases of syphilitic chancre accompanied by suppurating buboes. [I have seen many such cases ; I have also seen the mistake Bossart mentions made so repeatedly that the warning does not seem superfluous.—J. W. W.]

PREVENTION.

The Berlin Commission on the Prevention of Syphilis have decided²⁶ _{Dec. 1, 1902} that for greater safety every prostitute should be examined at least twice a week, and in suspicious cases the vaginal

secretions should be examined microscopically. Every diseased prostitute is to be sent to a hospital with a special department for such cases. All legal restrictions, such as the sick-fund law, etc., unfavorable to venereal cases should be done away with. The maintenance of legalized brothels is not recommended, either from a moral or hygienic stand-point.

Fiaux¹⁰⁰, makes the remarkable record of having examined 6579 workmen employed by the Northern Railway Company, of Paris, between the years 1888 and 1892, and in that number he found only 12 with virulent urethritis, 2 with "simple ulcer" and suppurating bubo, and 1 with syphilis. [These observations prove one of two things: either the "Chemin de fer du Nord" attracts only young gentlemen of unimpeachable moral character, or else the learned doctor was suffering from myopia. It is almost impossible to conceive of a community in which less than $\frac{1}{4}$ per cent. are afflicted with venereal disease, especially when the statistics are drawn from examinations of railroad employés in Paris.—W. H. F.]

HEREDITARY SYPHILIS.

To the usual three sets of symptoms of hereditary syphilis described by Hutchinson, namely, malformation of the teeth, diseases of the eyes, and of the ears, Fournier³¹ adds three others, which, he says, are quite as important as Hutchinson's in making a retrospective diagnosis of hereditary symptoms: (1) physical development; (2) cicatrices on the skin and mucous membrane; (3) condition of the osseous system. Deformities of the skull are chiefly found upon the forehead, and of three varieties: (1) a barrel-shaped forehead; (2) lateral bosses; and (3) a chicken-breasted forehead. Numerous small bosses may be scattered over the skull, or there may be a general transverse enlargement; perhaps the most characteristic, nay, almost pathognomonic, sign is the natiform skull, with a transverse enlargement, lateral bulgings, and a flattening in the middle. Lastly, there are the asymmetrical and the hydrocephalic skulls, which, in a great number of cases, may be considered as signs of hereditary syphilis. A sunken and deformed nose is also an important evidence of syphilitic taint.

With regard to the long bones, the tibia is the tell-tale above all others; swellings and nodes are the rule, deforming the diaphysis, either flattening out the crest or, by bony deposits, curving it until

it has the shape of a sabre. This "sabre-shaped" tibia is a most important evidence of hereditary syphilis. The chicken-breasted thorax is also frequently observed. Fournier differs from Parrot in thinking that hereditary syphilis and rachitis are one and the same. He believes that, while the two diseases are frequently associated and are similar, they are not due to the same specific cause. [While it is true that there is a great likeness between the two diseases, there are so many points of difference, both clinical and pathological, that there can be little doubt of their essential independence of each other.—J. W. W.]

Carini⁵⁷ emphasizes the importance of an early recognition and prompt treatment of hereditary syphilis,—a task which he, however, acknowledges to be difficult, until the disease is clearly manifested. Children doomed to hereditary syphilis are, in the vast majority of cases, born without the least sign of the taint. Even when it does appear, the roseola, so fleeting that it is hard to recognize, seldom lasts more than thirty-six or forty-eight hours. Hugnier reports only two cases of syphilitic eruption at birth, and regards such cases as very rare. Ricord is quoted as saying that he had never seen children who were born with symptoms of hereditary syphilis; such cases, however, have been observed by Cullerier, Cooper, Rondelet, Guerard, Landman, Diday, and by Carini himself. The majority of observers assert that hereditary syphilis breaks out mostly from the fifth day up to six weeks after birth, rarely as late as four or eight months. [Roger's statistics show that, among 249 cases, 217 showed symptoms before the end of the third month.—J. W. W.]

Coryza is generally supposed to be one of the earliest symptoms of hereditary syphilis, but Carini has observed, in numerous cases, that an obstinate singultus appeared shortly after birth and before the general onset of the hereditary symptoms. All usual cases of singultus were excluded, and therefore he assumed that it was due to a neurasthenic disposition of the central nervous system, especially in the bulbar regions, caused by the toxicity of the blood. The singultus usually begins a few hours after birth and lasts ten or twenty days, preceding coryza and other syphilitic symptoms, and resisting all ordinary remedies; it yields as if by magic to the administration of large doses of potassium iodide to the mother and "liquor Van Swieten" to the child.

According to Taylor²⁴⁵ testicular affections are among the rarer manifestations of hereditary syphilis. Pathologically, the testicular lesion has been recognized by Hutinel as early as the ninth day and the twenty-third day after birth. Clinically, however, it is generally seen in children from three months to one year old, with diminishing frequency in the second and third years. The testis becomes moderately enlarged, about the size of a pigeon's egg; there is no tendency to form large tumors; it is painless, hard and firm, indolent, and decidedly heavy. In rare cases, shot-like nodes can be felt on the surface of the tunica albuginea. The epididymis may be slightly or considerably enlarged. These affections usually run an uneventful course and may end in resolution or atrophy. Abscess and necrosis of the testis are rare and are accompanied by a sinus in the scrotum, which leads down to a pus-cavity in the gland itself. The concomitants of this affection in the very early months may be roseola, papular syphilides, mucous patches, etc. Not infrequently the affection is unilateral and is difficult to diagnose from tuberculosis. In all cases it is necessary to examine the prostate and seminal vesicles, which are commonly associated in tuberculosis and rarely in syphilis of the testicle. Cases have been reported in which the syphilitic history is clear and yet intelligent and active antisyphilitic treatment fails to produce resolution. In these cases we observe that which is frequently seen in adults, namely, a tubercular infection in a syphilitic subject. Mixed treatment with local frictions of mercurial ointment seems to give the best results.

Carpenter³³⁶ has made virtually the same observations as Taylor, except that he has frequently found the affection so slight as only to be determined by the microscope. Sterility often results. He thinks that double orchitis is more frequent, and is apt to be associated with hydrocele. Fournier¹⁵⁷ also calls attention to the testicle as a means of diagnosis. The lesion is usually double, and as it is painless, or almost so, usually escapes the notice of parents and medical attendants. If the syphilis is inherited, the testicles become atrophied, hard, and irregular in shape.

There is much uncertainty whether or not syphilis hereditaria tarda may be justly classed as a separate phase of hereditary syphilis. Neumann,⁵⁷ in an exhaustive examination of the subject, states that, in order to diagnose syphilis hereditaria tarda,

one or both parents at the time of procreation or gestation must have been syphilitic ; and freedom from syphilitic affections during the earliest years of childhood must be positively established. In this second statement he differs from Fournier, who does not exclude early manifestations of syphilis. All that Fournier considers necessary to diagnose hereditary syphilis as tarda in contra-distinction to *præcox* is that it should make its appearance some years after birth, whether at the end of this term it became virulent for the first time or whether it was preceded in the earliest periods of life by other attacks of the same origin, with an intervening state of freedom. He limits the beginning of syphilis hereditaria tarda to the end of the third year, and, as the extreme limit for mature years, he takes the twenty-eighth and discards all cases developing after that period as unreliable.²¹⁰⁵ Mauriac agrees in the main with Fournier in considering manifestations of hereditary syphilis which appear late in adolescence as tardy, whether or not they were preceded by syphilitic symptoms in the first months of childhood.

Neumann states that rigid examination into the family and personal history of the patient is, of course, necessary to ascertain whether or not the patient has a family taint, and also whether or not syphilis manifested itself in early childhood. Among the most characteristic signs of syphilitic taint in the family history are frequent miscarriages on the mother's side and death from suspicious ailments in early childhood of the brothers or sisters of the patient. Next, in order to exclude the possibility of syphilitic manifestations in the earliest years of the patient, a most rigid search is requisite for scars or pigmentation on the genitals, on the circum-anal regions, and at the corners of the mouth.

As for the way in which syphilis hereditaria tarda manifests itself, an arrest in general development is apparent, which Fournier calls "infantilismus." Such patients are small, weakly, of frail and bony structure, and poorly-developed muscles. Their skin is of a peculiar tawny hue, their sexual organs but little developed, and hair on the chest, genitals, and face comes late and is scanty. The intelligence keeps pace with the stunted growth.

Neumann thinks that too much reliance should not be placed upon the "Hutchinsonian triad of symptoms," for all these symptoms may be caused by various other diseases of childhood.

The Hutchinsonian teeth go to prove only some severe illness, not necessarily syphilis, but, for instance, rachitis during childhood. Likewise, continues Neumann, the keratitis parenchymatosa has been shown to be due to syphilis in only about two-thirds of all cases; for the remaining third, other causes are responsible. There are two kinds of affections of the bones which are met with in syphilis hereditaria tarda, namely, osteoperiostitis and gummosus osteitis. The former attacks the long bones and also the bones of the cranium, but not as frequently as does the gummosus osteitis, which gives rise to extensive destruction, as seen in cases of deformity from necrosis of the bones of the nose; these processes, however, are essentially the same as in the acquired form or in syphilis hereditaria præcox. Among the most common manifestations in syphilis hereditaria tarda are cerebral lesions resulting from pressure from gummata or from diseased arteries. These lesions give rise (1) to excruciating headaches, especially at night, which resist all treatment save potassium iodide; (2) to typical epileptiform attacks, which occur chiefly at the age of puberty, and which promptly react under antisyphilitic treatment; (3) to psychopathies of the most varied character. Very striking among them are cases of sudden arrest of mental development. There is, however, no one pathognomonic sign or symptom of syphilis hereditaria tarda, but only such symptoms as serve to put us on guard and give us a possible clue to work upon. There is every reason to believe that such a thing as syphilis hereditaria tarda may exist, as the acquired form of syphilis offers, in its capacity of lying latent for ten or fifteen years, such a striking analogy. [As a matter of fact the symptoms of syphilis hereditaria tarda are practically those of tertiary syphilis in the acquired disease, and in the presence of a history of syphilis in earlier life it seems a simple and easily-understood phenomenon, not requiring special classification or description. There is a strong probability that the great majority of cases of syphilis hereditaria tarda are of this type.—J. W. W.]

With regard to the untrustworthiness of Hutchinsonian teeth in the diagnosis of hereditary syphilis, Talbot⁷⁷⁰ says that teeth thus deformed are simply demonstrations of arrested development due to defective nutrition, and are no more pathognomonic of syphilis than of scarlet fever, measles, typhoid fever, and the like, to which

the child was subject during the calcification of the permanent teeth. [In my opinion this question has been discussed *ad nauseam*. Mr. Henry Moon long ago formulated clearly the position of both the medical and dental professions in regard to it: "The question, really, is this: Is there one peculiar conformation of the teeth due to inherited syphilis and not produced by any other cause? The evidence in favor of an affirmative answer to this question appears to me to be so strong that I think the onus of disproof rests with the skeptics." The question and answer remain the same to-day.—J. W. W.]

Hutchinson⁸⁰⁶ reports three cases of hereditary syphilis, which undoubtedly might be classed under the head of syphilis hereditaria tarda, as defined by Neumann, wherein not one of the three children showed the least sign of syphilitic taint during early infancy; but at the age of puberty one developed syphilitic ulceration of the throat, another interstitial keratitis and deafness, and the third a severe attack of keratitis. When two of the children cut their permanent incisors they had no trace of Hutchinsonian teeth; a fact which this author says corroborates the hypothesis he has always maintained, namely, that such peculiarities are only the direct results of inflammations in infancy. The mother of the three children was distinctly syphilitic, and it is interesting to note that the difference in age between the eldest and youngest child was seven years; hence, it appears, the mother was capable of infecting her children during that long period. Erlenmeyer^{114, 147} also reports two cases in which hereditary syphilis did not develop until the twelfth and the thirteenth years. One case developed syphilitic lesions in the mucous membrane of the mouth, swollen glands, and eruption on the skin. The other suffered from syphilis of the bones and joints. There was no history of syphilis in infancy. Both cases yielded completely to antisyphilitic treatment.

Büttner,²¹, reviewing an article on congenital syphilis by Erlenmeyer,¹¹⁴ quotes that author as asserting the possibility of congenital syphilis developing after many years, without having manifested itself in the slightest degree in early infancy; and he also cites a case of Erlenmeyer's which opposed Colles's law,—namely, that of a woman who, having borne two children to a syphilitic husband, did not acquire the disease until her third pregnancy. Up to that period, consequently, the wife had been

neither syphilitic nor immune. Hence, the conclusion is drawn that mothers who have had congenitally syphilitic issue may possibly, but not necessarily, become syphilitic. [The possibility of the first two children having had a different paternity from the third should not be lost sight of in estimating the value of such cases, which should always be regarded with suspicion, as opposed to one of the most unvarying clinico-pathological laws yet formulated.—J. W. W.]

J. Hutchinson⁸⁰⁸ reports a case in which an hereditarily syphilitic child was born to a father during his secondary stage, and subsequently, during his tertiary stage, his wife, who remained uninfected throughout, bore him two children, both perfectly healthy. To the law of Kassowitz, in regard to the gradual lessening of intensity of hereditary syphilis, Erlenmeyer opposes certain cases in which alternately sound and diseased children were born, while the sexes, as far as infection was concerned, were diversely apportioned; when the male issue was syphilitic, the female was perfectly healthy, and *vice versa*. If, therefore, a healthy child succeeds one congenitally syphilitic, but of the opposite sex, it is not proof that the power of transmission of the paternal syphilis is extinguished. [Here, again, I am led to remark that such reports of apparent exceptions to well-established laws should not, in the very least, affect our acceptance of these laws as valuable guides in matters of diagnosis and prognosis. Such an alternation as Erlenmeyer describes between male and female and health and disease would require for its confirmation a much larger number of cases than have yet appeared, or, I may add, than are likely to appear.—J. W. W.]

In speaking of syphilis acquired in infancy, Fournier¹⁵² asserts that it is never contracted by the child in its passage through the birth-canal, even though the mother is suffering from mucous patches of the vagina and vulva. This is because the child is already syphilitic, and cannot be infected afresh. Likewise, a woman syphilitic before the birth of her apparently-healthy offspring cannot infect that child at a later period, because that child is hereditarily syphilitic. The actual sources of acquired syphilis in children are (1) the wet-nurse; (2) their near relations, servants, visitors, etc.; (3) criminal offenses, comparatively rare, which are not always due to criminal passion, but to the super-

stitious belief that an affected person may thus get rid of the disease; (4) the hands or instruments of the medical attendant; (5) vaccination. The foregoing possible sources suffice to prove that acquired syphilis in childhood is far from being as rare as is generally supposed.

[In reference to this matter I wrote, some time ago: "Direct infection of the child during birth could not properly come under the head of hereditary syphilis. There is no possible reason why, when the mother has contagious lesions of the genitals, acquired too late to infect the child *in utero*, this should not occur; but, as a matter of fact, no such case has ever been recorded. One explanation of this circumstance may be found in the protective covering of vernix and mucus which coats the infant's body and lessens greatly the risk of absorption. This hardly accounts satisfactorily, however, for the entire absence of such cases from medical literature; and it is fair to suppose that in all but those cases in which the primary sore is acquired during the last month of gestation,—which, for obvious reasons, are excessively rare,—the infant acquires some immunity which protects it from its mother, and is similar to that which, under Colles's law, operates in her favor. In other words, even though apparently free from syphilis at birth,—a not uncommon event,—it has a latent or modified syphilis which protects it from contagion."—J. W. W.]

Puech²³⁸ reports a case of hereditary syphilis with paralysis of the right arm and paresis of the left arm, followed in about a month and a half by death. The mother showed signs of secondary syphilis at the seventh month of pregnancy. The paralysis was found to be due to a large abscess in the axilla pressing on the brachial plexus; the vertebræ were free from caries.

J. Hutchinson⁸⁰⁸ reports a case of palmar psoriasis occurring in connection with hereditary syphilis, and is of the opinion that, although the psoriasis is due to the syphilitic taint, it is not necessarily a syphilitic lesion, and probably will not yield to specific treatment. Palmar psoriasis is seldom seen in the acquired form of syphilis, except in those whose hands are more or less irritated by friction.

Schuster²¹⁰⁸ decides that, before a syphilitic may marry, at least two years must elapse, to be spent as follows: Two courses of mercurial treatment, of twenty-five to forty-eight days' dura-

tion, separated and followed by an interval of five to ten months' absolute freedom from symptoms. If a relapse occur in course of treatment, or afterward, the patient must again have two courses and two healthy intervals of five to ten months. [“At least two years” is altogether too vague for sound teaching. If we must lay down a rule to apply to the great majority of cases, it should be “at least four years.”—J. W. W.] Speaking of syphilis in married people who have had a syphilitic child, he lays stress on the efficient treatment of fathers and mothers; in the latter the treatment is to go on during the first three or four months of pregnancy, followed by a rest for two or three months, and a second course of treatment after the seventh month. As to hereditary syphilis, he upholds the usual view, that it is never transmitted to a third generation. In this connection, Hewetson⁷⁸⁴ J.M.P.B. reports the case of a mother afflicted with late hereditary syphilis and syphilitic nodes and enlargements of the bones, at the time of pregnancy, who finally was delivered of a perfectly healthy child, which remained healthy up to three and a half months, when observation of the case ceased. [Why any one should think it worth while to publish a case of a mother with “late hereditary syphilis”—or with “late” acquired syphilis, for that matter—having a healthy child is a mystery. Authentic cases of *syphilitic* children from such parents would be of great interest, but at present there are none recorded.—J. W. W.] Hewetson quotes Fournier as saying that the transmission of hereditary syphilis to the second generation is plausible in theory, acceptable to reason, but not yet established as an indisputable fact.

INITIAL LESION.

Two cases which came under Paul's observation,¹⁴ where chancres with trifling secondary lesions were entirely cured within a year, led him, guided by the family history in both cases, to the following conclusion: A syphilitic father who, after specific treatment, had been for several years free from any syphilitic symptom, and so remained at the time of conception, but on whom the disease, many years subsequently, broke out with unusual violence,—such a father may transmit to his sons a power of resistance to syphilitic infection which, if it does not amount to absolute immunity, at least renders them liable, albeit quite free from any hereditary symptoms, to attacks of only an exceedingly mild and

attenuated form of syphilis. [A very large edifice to erect upon such a trifling foundation!—J. W. W.]

The following methods by which a mixed chancre is produced are given by Balzer³¹: 1. By inoculation from a mixed chancre; this, however, is rare. 2. More often the inoculation takes place from two successive contacts,—one with a chancroid, the second with some virulent syphilitic lesion co-existent with the chancroid. 3. It may arise from contact with a chancroid on a syphilitic person, in which case it is probable that the transmission of the syphilitic virus is by means of inoculation with syphilitic blood, or else that the syphilitic virus has exuded to the surface of the chancroid. Furthermore, a double sore may be the result of two inoculations, somewhat separated in point of time. A fully-developed chancroid may be inoculated with syphilitic virus, and an indurated chancre succeed the chancroid; this is called a "syphilized chancroid"; or, *vice versa*, a chancre may be super-inoculated with chancroidal virus; this, then, is known as a "chancrellized chancre." Contrary to what might be supposed, transinoculation is not so very easy; we frequently find a chancre in close proximity to a chancroid, without mixed infection taking place. This fact Balzer explains as follows: The syphilitic chancre does not encroach upon the derm, but only as far as the epiderm, the Malpighian bodies remaining intact. This serves somewhat to protect the indurated chancre from inoculation with chancroid; since, on the other hand, the chancroidal virus has to penetrate as far as the derm. For this reason a "syphilized chancroid" is much more common than a "chancrellized chancre." Small satellite chancroids are frequently seen around the mixed sore, but there is nothing particularly characteristic in the sore itself; it is rather more like a chancroid than a chancre except that it rests on an indurated base, and is accompanied by polyganglionic enlargement, and probably by a suppurating bubo.

Those cases of phagedenic syphilitic chancre, which are so often reported, are in many instances nothing more than mixed lesions. Auto-inoculation gives absolutely no information with regard to the presence of syphilitic virus in the case of a mixed lesion, because, of course, the chancroidal element is auto-inoculable, and therefore a sore similar to the parent-sore is the only outcome of auto-inoculation.

Krowczynski^{45, 50},_{p. 71, Apg. 10} inoculated fifteen persons with pure pus from soft chancre, and in a second locality, on the same subject, he inoculated a mixture of the pus from the same source, and a 3-per-cent. acidulated solution of hydrogen peroxide. Typical chancroids followed the inoculation with pure pus, but the pus mixed with hydrogen peroxide had been rendered innocuous. Inoculations with the pus from a syphilitic chancre and from a mucous patch, treated in a similar manner with hydrogen peroxide, in both cases failed to produce syphilis. Without pursuing the subject further, Krowczynski thinks it would be useful to know whether acidulated hydrogen-peroxide solution would not be an excellent prophylactic wash after a suspected coitus.

Brown²⁴⁵ reports a case in which the chancre was situated quite within the urethra, palpation distinctly revealing a point of induration. On examining the lesion scarcely anything was visible but a slight erosion. The meatus was œdematous, and from it exuded a viscid, whitish fluid.

Taylor²⁴⁵ says that an encrusted form of chancre is not rarely found in the urethra, sometimes resembling a small layer of ivory or a cartilage. No visible change in the mucous membrane may perhaps be associated with such a lesion. He has seen one case in which the chancre was situated four inches within the urethra.

Dubreuilh²⁵ reports the case of a woman whom he examined most carefully to find the initial lesion of a syphilis contracted from her husband. The symptoms were vague: the patient complained of a leucorrhœa of about two weeks' duration and a moderately painful angina, with only a slight reddening of the tonsils and isthmus of the fauces. The tongue and lips were not affected; the vulva was irritated by the vaginal discharge, but not ulcerated; there was no eruption on the skin, no enlargement of inguinal glands, but constant headache with nocturnal exacerbations. With a speculum he detected the chancre on the left side of the cervix uteri, but not touching the orifice. All symptoms disappeared under specific treatment. The condition of the husband led to a thorough examination, otherwise the case would probably have gone undiagnosed, as very many such typical cases likely do.

Taylor²⁴⁸ has noted a case of what he alleges to be multiple chancre, in which three of the lesions were on the penis and one on the lips. These lesions were followed by syphilitic symptoms

of the most malignant type. Another unusual factor was the development of a phlebitis in the form of a quill-like cord running up the penis and ending in a large mass near the abdomino-scrotal angle. There was polyganglionic enlargement in both groins. This author thinks that the quill-like cord running up the penis, which is so frequently called lymphangitis, is really a phlebitis.

RE-INFECTION.

By a series of cases accurately observed by trustworthy observers, Horovitz²⁸³ maintains that the doctrine that there can be no recurrence of syphilis has been forever refuted. However, it must not be assumed, from the possibility of a re-infection, that every indurated lesion occurring after an impure coitus is a primary syphilitic affection. To be a case of re-infection it must be followed by the usual secondary effects. Horovitz formulates the following conclusions: That as long as the patient shows the signs of evident lues there is no re-infection; that nodes of evidently syphilitic appearance, after adequate irritation accompanied by no consecutive symptoms, are to be regarded as syphilitic products and classed with the original infection; that the thickenings of the tissue which occur after irritation in the locality of the sclerosis are to be regarded as local relapses,—that is, as re-induration. Anatomically these last two conclusions are to be attributed to the activity of what Horovitz calls "the virulent dormant cells." Finally, that re-infection must never be inferred and diagnostically affirmed from the presumptive primary effects alone, but from these together with the peculiar secondary indications of syphilis.

Swinburne²⁴⁵ reports a case of apparent re-infection. When first seen the patient had a small ulcer on the floor of the mouth, a fading roseola, and a faint cicatrix on the prepuce half an inch back of the glans. The initial lesion was contracted in April, 1889. On December 23, 1892, the patient returned with a lesion on the prepuce just back of the glans, with an incubation of thirty-three days. At his earnest request, he was put on specific treatment on the thirteenth day. The epitrochlear glands became enlarged, but up to August of that year no other symptoms had shown themselves. Swinburne does not feel at all sure that this is a case of re-infection, owing to the fact that no secondary manifestations appeared.

Willis¹¹² reports a case of re-ulceration at the point of former inoculation. The present sore was superficial and non-indurated twenty-six years after the first infection. The sore healed under local applications of iodoform, and was twice touched with nitrate-of-silver solution, 15 grains (1 grammme) to 1 fluidounce (31 grammes). Internally, he was given pil. ferri iodidi. Six weeks subsequently no further symptoms had appeared. [Both these cases point to Horovitz's wise caution, and demonstrate the liability to be deceived by tertiary lesions which can only be identified by the failure of the roseola to appear or by the presence of other coincident tertiary symptoms.—J. W. W.]

Salsotto⁵⁷,¹¹ reports an undoubted case of re-infection occurring twenty-seven years after the first attack. Salsotto believes himself to be able to prove the first attack genuine without a shadow of doubt. The patient contracted his second chancre out of wedlock; it was followed by a roseola, and he also infected his wife with syphilis. Contrary to the teachings of most syphiliographers, this second infection was followed by a malignant form of syphilis.

EXTRA-GENITAL CHANCRES.

Extra-genital chancres seem to attract more comment and involve more statistics than almost any other subject of syphiliography; apparently, young physicians, on observing this lesion for the first time, hasten to proclaim their discovery to the world, and to expatiate, for the benefit of the profession, on a subject which they appear to think has never been touched upon before, at the same time admitting that these lesions are so exceedingly common that we should be constantly on the lookout for them in doubtful cases. The Germans, with their well-known thoroughness, seem to take delight in enumerating, in long lists, the household utensils which may be the vehicles for the poison; the French, of all nations, indulge in tirades against kissing, and against smoking cigarettes in common; while American and English writers pride themselves on their sagacity in diagnosis. Syphilitic chancres have been observed on every conceivable region of the body in which the blood circulates, until now the problem of real interest is to find any spot whereon syphilis cannot be inoculated. Ricord at one time claimed that the scalp was immune to primary syphilitic infection; but Allen²⁴⁵ reports a case of chancre in this very locality; and Taylor,

in the discussion, says that he has observed chancres on almost every part of the face and scalp. In like manner it has been claimed that chancre of the eyelid is of rare occurrence ; Masit. ³¹⁹ _{No. 47, 19} Barjong, ²¹¹ _{June 11} and Ring, ⁵⁰ _{No. 8, 19} however, report such cases within the year.

Cotterell ²² _{May 10} denies that the greater severity of symptoms following extra-genital infection is due to a lack of recognition of the disease at the outset, and consequently not treated. He maintains that, as a general rule, manifestations following extra-genital infection are more severe from the very start ; even the secondary enlargement of the neighboring glands does not partake of the character of the ordinary "bullet bubo" of the groin, secondary to a genital chancre. In this connection, Hutchinson ² _{Apr. 29} cites the case of a patient of his who had contracted a chancre on the cheek from a bite, and whose syphilis resisted the influence of mercury administered by the mouth for many weeks, and only finally yielded to inunctions. Cotterell ² _{Apr. 29} observed a similar resistance in the case of a man suffering from chancres both on the penis and on the lip. [I have frequently made the same observation as regards chancres of the lips or face, but have always attributed the greater malignancy of such sores to the same element which gives them their greater size, viz., the proportionately large supply to these regions of blood-vessels with their accompanying lymphatics. It seems reasonable to suppose that an excessive dose of the virus and of its products may result in a more than ordinarily severe form of the disease.—J. W. W.] On the other hand, Stewart ¹⁸⁷ _{July} reports a case of chancre in the corner of the mouth, unaccompanied by any severe symptoms, which yielded readily to mercurials and potassium iodide. Two cases are published by Owsley, ⁷⁷⁹ _{Mar.} in which he was able to observe both the male transmitter and the female recipient, the lesion being on the tongue in the man and on the left tonsil in the woman. What is here of interest was the mildness of the symptoms in the man and their severity in the woman, whose tonsils were enlarged, especially the left, the whole mucous membrane of the mouth being covered with a thick, grayish mucus, with immense enlargement of the submaxillary and cervical glands. In the case of the husband, the extent of the disease seemed to be the initial sclerosis on the dorsum of the tongue and a few small, scattered, mucous patches on the tonsils and walls of the pharynx. Owsley

attributes the severity in the woman's case to the situation of the initial sclerosis in the loose tonsillar tissue and in its ultimate relation to the large lymphatics, thereby predisposing to a high grade of local inflammation and to rapid dissemination of systemic infection. In both cases two weeks of antisyphilitic treatment produced marked amelioration.

Peter⁴¹ records 24 cases of extra-genital infection, 3 of them in children. In no case were the symptoms more severe than when the lesion was situated on the genitals. In children, Peter notes, the sore is easily overlooked, and the result is that at a later stage the case is erroneously classed as syphilis hereditaria tarda. Further cases of extra-genital lesions have been reported as follows: Dubois-Havenith,⁶² chancre on index finger; Starr,³⁹ chancre of lower lip; Cadell,³⁶ 12 cases of chancre in the vicinity of the mouth; Barham,¹⁶¹ 8 cases; Grizwow,⁶⁷³ Raymond,⁷³ Aug. 8 Lejars,¹⁴ Mar. 11 chancre of index finger and thumb; Feulard,¹⁴ Nov., 1882 chancres of the head in children, 3 cases; Faguet,¹⁵⁵ Oct. 9, 1882 chancre of index finger.

SECONDARY SYPHILIS.

Zeisler,⁷⁹ in describing the relations of the lymphatic glands to syphilis, designates the swelling or engorgement of the glands in certain typical localities near the surface of the body as one of the most important symptoms of constitutional syphilis; he does not refer to the indolent inguinal bubo, but to the more general ganglionic enlargement which commonly occurs toward the latter part of the secondary incubation. Constitutional tendency plays an important part in the degree of this enlargement. It is well known that some persons develop lymphatic swellings from trifling causes; these patients naturally respond to syphilitic infection with very marked lymphadenitis. The degree of severity of the disease in general is another determining factor. To conclude from this fact that lymphatic engorgement is only a secondary symptom Zeisler thinks is erroneous, since the glands are often affected long before any cutaneous eruption appears. The diagnostic value, consequently, of ganglionic enlargement is often overestimated. The presence of numerous palpable glands, together with other important signs, forms strong positive evidence, but their absence cannot be used as equally strong negative evidence, for they occur regularly only in the latter part of the incubation period and in the

active stage of the disease directly following it. To look for them with a view to strengthening the diagnosis in the tertiary stage is useless. It is, on the other hand, never justifiable to declare a patient as syphilitic from the fact that one or other isolated gland is noticeably enlarged. Dietrich,⁴⁵ in an examination of 437 healthy persons, found distinguishable glands in some part or other of the body in 97 per cent. of the number. He could feel the cervical and supra-clavicular glands in 79 per cent. of them; the axillary glands in 72 per cent.; the epitrochlear glands (supposed to be pathognomonic of syphilis) in 82 per cent.; and the inguinal glands in 73 per cent. [It is the degree of swelling and of continuous and otherwise inexplicable enlargement that gives the syphilitic adenopathy its diagnostic value. The mere existence of slight glandular enlargement is of but little intrinsic importance and may be misleading.—J. W. W.]

Zeisler opposes the theory that the lymphatic glands act as reservoirs whence the syphilitic virus is at times distributed into the general economy, which, he says, is not borne out by clinical observations. The softening and gradual disappearance of the ganglionic enlargement is not accompanied by an aggravation of symptoms, as it undoubtedly should be were this theory correct. In the appearance of these glands there is nothing which can be considered as pathognomonic of syphilis, and it remains for future bacteriological researches to demonstrate in them the supposed microbe of syphilis.

Audry¹⁰⁸⁸ divides into three classes the syphilides observed upon the tongue in secondary syphilis, as follow: (1) the mucous patch with varying aspects, (2) white syphilides of the dorsum, and (3) lymphatic syphilides. The ordinary mucous patch assumes different appearances according to its situation on the tongue. On the lower surface of the free edge, where the mucous membrane differs scarcely at all from that of the lips, mucous patches conform to the well-known type, viz., a round or oval superficial erosion, opaline in color with sharply-defined borders, surrounded or not by a zone of erythema. The characteristic mucous patch of the tongue develops on the median portion of the dorsum, and is hypertrophic. It projects above the surrounding tegument and represents a large submucous papule. It is variable in size and is sometimes surrounded by a furrow.

The white syphilides of the dorsum are to be seen on the anterior dorsal segment; they vary in shape and severity. In a mild case the mucous membrane of the anterior dorsal region has a marbled appearance on a pale-white ground, rose-colored patches with sharply-defined borders, indented like the outlines of a geographical map, of exactly the same appearance as marginated exfoliating glossitis; another variety of white syphilides presents a bearded appearance, so to speak, of the papillary mucous membrane; the papillæ are elongated, swollen, and of a dirty-white color. The tongue has somewhat the same appearance as if the patient had just been drinking milk. The lymphatic localizations of secondary syphilis are to be found on the posterior segment of the tongue, and to observe them properly requires a mirror. The typical lesion of the tonsil is characterized by irregular prominences, yellowish white in color, circumscribed by furrows of variable depth. There is generally a marked degree of inflammation associated with these lesions.

Lastly, Audry refers to the tumefactions in the small lateral lymphatics of the tongue, which, he thinks, are almost constant. They are found in many other diseases, especially mild digestive disorders, but they also certainly bear a close relationship to syphilis and might more properly be classed as parasyphilitic manifestations. This author does not attach much importance to the theory that alcohol and tobacco are important factors in the etiology of lingual syphilides. Marginate desquamating glossitis or geographical tongue Audry thinks is a syphilide pure and simple, but he does not claim that it is caused by syphilis alone.

Giovannini,²⁸ _{p. 11, May} after an examination of sections of the scalp in twenty-four cases of alopecia syphilitica, draws the following conclusions: 1. There is an inflammatory process in progress in the skin in alopecia of secondary syphilis, although no clinical changes are apparent. The lower part of the follicle is especially affected, there being a true folliculitis pilaris profunda. Microscopically this appears as a perivascular leucocytic exudation. 2. In consequence of this, retrogressive changes occur in the hair, causing it to fall out. 3. The hair-follicle is not affected.

Concerning albuminuria during the secondary stage, Clignet,²⁴³ _{May} after a careful study of the subject, comes to the following conclusions: (1) transitory albuminuria with all its syndromes may

be observed during the secondary stage of syphilis; (2) it is almost always benign, and is cured rapidly; (3) it yields to simple mercurial treatment equally with other secondary manifestations; (4) it is the expression of a diffuse nephritis of an infectious character, due to a cellular or microbic toxin.

Geraud ²⁴³_{Nov. 10, 1898, Mass.},⁵ noted the presence of albuminuria in 21 of 46 cases of syphilis, 11 in the primary, 8 in the secondary, and 2 in the tertiary stage. In 4 cases the albuminuria preceded the roseola and in 7 it accompanied or followed it. The albumen disappeared under antisyphilitic treatment. Geraud believes that the albumen in the primary stage is analogous to that which occurs in the acute infectious diseases. Albumen in the tertiary stage is due no doubt to alterations of the blood without kidney-lesions.

Paterson ⁵⁸⁶_{Nov. 21, 1898, Mass.},⁶⁷³ estimates the frequency of the occurrence of albuminuria in secondary syphilis at from 3 to 8 per cent.

An interesting case of the somewhat rare circinate erythematous syphilis is described by Etienne ⁸¹_{Aug. 22} as follows: Spots of erythema, from the size of a half-dime to that of a half-dollar, more or less regularly rounded; some nummular; some (especially the larger ones) distinctly circinate with continuous borders, without any tendency to extend eccentrically, perfectly flat, and covered with a fine, seedy, furfuraceous desquamation; their color is rose, with just a tinge of orange. The eruption is accompanied by absolutely no itching. In the present case the eruption was coincident with secondary lesions, but, nevertheless, Etienne thinks that an eruption of this sort is not to be regarded as a secondary lesion, pure and simple; it is, he says, hard to classify exactly, since its time of appearance is so irregular; it may be ranged beside superficial depapillating glossitis, and pseudo-psoriasis palmatis or plantaris, among the unclassified lesions which may be either extremely precocious or extremely tardy. Fournier considers it as a manifestation of a syphilitic diathesis somewhat old and attenuated by mercurial treatment, and in this view Mauriac and Jullien concur. In Etienne's case this eruption occurred early in the disease, and when no mercury had influenced it. Morel-Lavallée considers the outbreak of a circinate erythema as of good presage for the future of the patient; but here, again, Etienne's case is at variance, as it was followed by most severe tertiary manifestations.

From observations of twenty-eight cases Lewin ^{45, 888}_{Feb., May,} describes, under the name of "clavus syphiliticus," a manifestation of secondary syphilis which has been hitherto but lightly regarded; at all events, as not especially characteristic. Clavi syphilitici are formations from the size of a pin's head to a pea, round or oval, flat; at first pale-red, afterward pale-yellowish; at first soft, but continuing to grow harder. They are most commonly in the palms of the hands, but may also be found on the soles of the feet or on the palmar surface of the fingers, surrounded by a slightly hyperæmic or desquamating zone. Subjective symptoms are but slight. They differ from warts in their smooth surface and localization, and from "clavi vulgares" in the lack of a central embolus and in their small prominence. They were at times observed contemporaneously with other syphilitic appearances, at times without them, their specific nature in the latter case being at once revealed by their prompt response to antisyphilitic treatment. Lewin contends that they are identical with the so-called psoriasis palmaris syphiliticus, and that the difference between these forms of papulo-squamous exanthemata is mainly only quantitative; the single papule may assume very different forms, according to its localization and to the rapidity of its development.

Tissier ^{37, 451}_{Feb., May} notes that secondary syphilis of the nasal mucous membrane occurs in about 68 per cent. of cases of syphilis in women. The first stage is erythema, the second erosion (preferably on the septum), the third a return *ad integrum*. Adhesion may develop, however, between the lower turbinate and septum, when they have been in contact. Although secondary nasal syphilis usually ends in complete cure, it should not be neglected, as it may lead to grave invasion in the tertiary stage.

TERTIARY SYPHILIS.

Haslund ^{678, 57}_{Feb., May} records, in his list of 6364 cases of syphilis treated in the Copenhagen Hospital, 791 cases of tertiary syphilis; 231 of these patients had never received mercurial treatment, 461 had only had a slight and insufficient treatment, and only 99 had been properly treated before the appearance of the tertiary symptoms. From these facts the author concludes that the prime factor in favor of tertiary symptoms is an insufficient treatment in the early stages of the disease, and, furthermore, that chronic alcoholism,

infection in late years, and the presence of other chronic diseases are predisposing causes. The point of outbreak of tertiary lesions is usually the point of least resistance, viz., in an organ or in a system already weakened or modified by preceding attacks of secondary syphilis. These conclusions of Haslund in regard to inadequate treatment are also shared by Lesser,²¹⁴ ~~215~~ who was led to them by an earlier publication of Haslund's partial list, which he compiled from observations of 514 cases of tertiary syphilis, and which shows that 86 per cent. of these cases had either undergone no course of treatment whatever or else only a very inadequate course during the secondary stage, which is an unanswerable argument to the antimercurialists. Lesser differs from Haslund as to the influence of malaria and alcohol.

The hypothesis that the glands store up the virus and at a later date distribute it to the blood-vessels is untenable as a cause for tertiary manifestations; universal eruptions would be the rule, which it is not. Lang's hypothesis is more applicable, which is that tertiary lesions arise from the proliferation of germs which have here and there survived the secondary stage, and which from some cause or other have been incited to sudden activity. This theory amply accounts for the recurrences of tertiary lesions at or near the same spot; and also for their occurrence in an organ which has been the seat of disease during the secondary stage. [It does not account, however, for the non-contagiousness of tertiary lesions.—J. W. W.]

There exists a noteworthy difference between the sexes in the capacity to transmit syphilis; this capacity is extinguished much sooner in man than in woman. In the wife it is found to exist far beyond the secondary stage. This fact possibly is due to the early age at which the ova are perfected, as even in childhood some perfected ova are to be found in the ovary; if then the woman were infected ten or fifteen years before pregnancy, a syphilitic germ might at that time have penetrated into the ovum, and remained dormant during that long period only to develop at last in the foetus. With the sperm-cells it is different; they exist but for a short time as such, and are produced as they are required, and hence the syphilitic virus is more quickly eliminated.

Finger's theory, that the tertiary lesions are due to the action of the metabolic products of the bacteria present in the secondary

stage, is to be confronted with the fact that the syphilis inherited by children from a mother in the secondary and in the tertiary stage of the disease is one and the same, and is also contagious, thus reproducing the initial lesion of syphilis. If now we adopt Lang's hypothesis of latent, lurking germs, then we surely must adopt Fournier's method of chronic intermittent treatment, whether symptoms exist or not, extending over several years, as the one best calculated to uproot and dispel these scattered foci for tertiary lesions.

Neumann,²⁴ found tertiary lesions in 665 out of 9742 cases of syphilis treated at his clinic, and, like Lesser and Haslund, in the main, in cases where the treatment had been inadequate in the early stages of the disease. He is of the opinion, however, that it is provoked by the development of such diseases as tuberculosis, malaria, scurvy, diabetes, Bright's disease, and chronic alcoholism. It chiefly concerns itself first with the skin, then the bone, then the viscera. It is possible that, as the result of pathological modifications of the tissues during the preceding secondary period, the late manifestations may arise on places formerly the seat of secondary lesions.

In apparent contrast to these opinions, concerning the lack of early treatment as a cause of the appearance of tertiary symptoms, is a case related by Morrison.²⁴⁵ A steam-boat captain on the Mississippi was advised to take the treatment for syphilis at the Arkansas Hot Springs because he had a chronic sore throat. He affirmed that he had never had a chancre nor any previous eruption on the skin. He was treated with large doses of potassium iodide, 270 drops of the saturated solution daily, and mercurial inunctions; about twenty ulcers developed on the body, arms, legs, and head, beginning as small hard lumps, to be felt before seen. The lump under the reddened skin developed into a deep ulcer of about an inch in diameter. Antisyphilitic treatment of every kind seemed only to aggravate the symptoms. Under applications of a saturated solution of pyoxtanin the ulcers healed to a considerable extent; there was, however, a relapse in a few months, when an "enormous ulceration" of the larynx, accompanied by a crop of whitish ulcers in the mouth resembling mucous patches, undoubtedly syphilitic, was discovered, for which 5 grains (0.32 gramme) of potassium iodide three times a day and Zittman's

decoction were prescribed, but without effect, and were followed by fresh ulcers, for which formamide of mercury was tried hypodermatically, with relief for a week or two, after which Morrison lost sight of the case. The author concludes it to be a record of simple syphilis overtreated in the beginning and rendered obscure by a peculiar susceptibility of the system to mercury and potash. [It would seem more like a case of persistent iodism.—J. W. W.]

Klotz,²⁴⁵ however, affirms that tertiary syphilis is a distinct disease, in so far as it is not directly produced by the action of the same bacillus, and also that it is inoculable as tertiary syphilis without being necessarily preceded by the primary and secondary lesions. He cites Finger in favor of the view that tertiary manifestations cannot be produced in the same manner by the virus as the primary and secondary ones. The tertiary stage is not to be considered as a direct consequence of syphilitic virus, but as a consecutive sequel or diathesis; in this stage the original virus has become completely eliminated, or the tissues have undergone a modification in consequence of the preceding process. He presents the following conclusions upon the subject: 1. Syphilis is caused by a micro-organism similar to those of the acute exanthemata, the primary and secondary local manifestations being due to the direct influence of this parasite, the presence of which in these lesions is proved by their contagiousness. 2. The general symptoms accompanying these stages, and immunity, are the result of the action of the toxins (Finger). 3. The micro-organisms, under the influence of their own chemical products, or of treatment, or in consequence of their innate character, are either eliminated or extinct, undergo some modification, or produce a new kind or species of micro-organism. 4. This secondary parasite, which is similar to the bacillus of tuberculosis, can indefinitely remain in the organism in a dormant condition until called into activity by some accidental irritation. 5. It then produces the tertiary, gummatous manifestations, but not the diffuse, chronic, visceral affections like tabes, general paralysis, etc., which are the result of intoxications with the toxins of the primary parasite. 6. The secondary micro-organism is inoculable, like the bacillus tuberculosis, and produces lesions identical with tertiary syphilis, but not primary syphilis. 7. Tertiary syphilitic manifestations may, therefore, be due to direct inoculation without the necessity of a

primary or secondary stage. [The last two conclusions, if correctly rendered, are in opposition to every known clinical fact of tertiary syphilis, and involve the acceptance of a complicated and unsupported theory and the belief in an hypothetical organism "secondary" to one not yet satisfactorily demonstrated.—J. W. W.]

The tertiary syphilitic affections of the penis, Sternthal⁴⁵, observes, are generally isolated, hard to diagnose, and are often confounded with chancroid, chancre (re-infection), or epithelioma. According to Fournier, there is a gummosous and a pustulo-ulcerous form, which latter begins with a pustule. An ulcer, however, may occur without preceding pustules, forming a dry crust under which develops a sharply-defined abscess strongly resembling a soft ulcer. These abscesses, situated on the glans penis, defy any purely local treatment. The gummosous form is more frequent, and may attack the whole surface of the glans with infiltrations which rapidly slough from the centre. The gumma of the penis is chiefly found on the corona glandis and in the sulcus retroglandularis; it has a hardness similar to an initial sclerosis and is extremely obstinate. It is often difficult to distinguish between these circumscribed syphilitic nodules and the non-syphilitic, hard, discoid indurations which are found at times in the fibrous integument or in the septum of the corpora cavernosa. Their origin is still unknown. The urethra may also be the seat of tertiary infiltrations which convert the urethra into a cartilaginous cylinder, or the mucous membrane may become the seat of ulcers and nodules. In all such cases large doses of potassium iodide are demanded.

Lewin²²,_{App.} lays stress upon the importance of examining the testicles and base of the tongue in forming a diagnosis of tertiary syphilis. Gummatous tumors of the testicle are frequently recognizable by simple inspection, careful palpation, and their peculiar hardness. Still more important is the examination of the glands of the tongue, smooth atrophy (Virchow) being pathognomonic of tertiary syphilis, and more easily recognized by the finger than by the eye. Lewin also reports a case of intense jaundice, with increased hepatic dullness, occurring during the course of a tertiary syphilis, due, he thinks, to a gummatous inflammation of the liver. Decided improvement followed the administration of potassium iodide.

Roussel⁹,_{May 20} reports an interesting case of galloping and malig-

nant syphilis, in which, nine days after the appearance of a chancre which rapidly became phagedenic, the patient was attacked with what appeared to be acute rheumatic fever. Four weeks later a suspicious eruption appeared on the body, together with a small tumor on the inner surface of the right tibia, in its upper third, intimately connected with the bone. Fever, with evening exacerbation, and intense headache lasting three or four hours, and followed by profuse sweating, were also present. Ten weeks after the appearance of the chancre a brawny swelling and a painful, deep, and irregular yellowish ulcer were noticed near the median line of the roof of the mouth. This ulcer spread rapidly and invaded the deeper structures; necrosis of the hard palate, as well as of the alveolar process of the superior maxillary bones and of the nasal bones, followed; rapid loss of weight and cachexia thereupon became an important feature. A pustular eruption appeared on the face and scalp; excruciating bone-pains, syphilitic boulimia, gastric crises, anæmia, and œsophageal obstruction occurred in rapid succession. In about the tenth month of the disease agonizing lumbar pains, with loss of control of the sphincter of the bowel, set in and continued until death,—a little over one year after the onset of the disease. Almost from the beginning of the disease mercury and potassium iodide seemed to aggravate rather than to alleviate the symptoms, and every known method of administering these drugs was tried without avail. Roussel notes, in conclusion, the growing tendency of syphigraphers to acknowledge that the accepted laws regarding three fixed and precise stages of the disease must submit to some modification. Gayon¹⁴³, reports a somewhat similar case, in which fever of 104° F. (40° C.) and intense cephalalgia followed a phagedenic chancre. The fever, with slight morning remissions, remained high for three days, when a pustular eruption made its appearance upon the skin and mucous membranes of the mouth. The case, however, yielded readily to mercurial treatment.

Legrain²⁸⁸ reports a case of ulcerated gumma of the glans penis accompanied with urinary fistula. He says that gummata in this region are sufficiently rare to justify any report. The lesion yielded rapidly to potassium iodide.

Bristowe²⁸⁹ believes that a gradual onset of symptoms is characteristic of syphilitic obstruction of the arteries of the brain, and

he has observed not a few cases of brain-tumor in which no appreciable symptoms were produced until the patient was seized with an epileptic fit, or some other sudden form of illness. Still, if in the course of vague cerebral symptoms a syphilitic patient had a sudden seizure and remained hemiplegic, the probabilities would be in favor of obstruction of vessels; whereas headache, giddiness, vomiting, optic neuritis, epileptic attacks, and mental failure are more likely to be produced by gummatous or pachymeningitis. The latter two are especially apt to occur at the base and to implicate cranial nerves. Moyer,⁷⁷⁹ however, is of the opinion that the nervous disorders occasionally seen within a few months after infection are not to be classed with those occurring much later. The earlier cases we must presume, he says, to be due to the direct effect of the bacillus, or to the generation of certain ptomaines during its development in the human body. The pathology of these lesions is quite different from that of the later ones, and they yield readily to the remedies appropriate for syphilis. The changes which come on from three to twenty years after infection are probably not due directly to the syphilitic infection, but rather to the nutritional disturbances to which the syphilitic infection has given rise; the lesions themselves have ceased to be syphilitic, although the infection has furnished a foundation upon which they have been built. We find, therefore, in these cases, that antisyphilitic treatment is, for the most part, ineffective.

Sexual excesses associated with previous infection are believed by this author to be a potent factor in causing locomotor ataxy. In paretic dementia syphilitic infection is often accompanied by a history of alcoholic excesses and an extremely irregular life.

An interesting case of syphilitic encephalopathy simulating general paralysis and tabes dorsalis is reported by Boissier and Lachaux.⁴⁶ The patient, of good family history, at the age of 24 had a miscarriage after three years of sterility; at this time her first symptoms manifested themselves. To loss of memory and intelligence were added violent irascibility, ideas of grandeur, occasional incoherent mutterings, and halting ataxic gait, with an inordinate desire for alcohol and indulgence in it. On account of the inco-ordination and irregular grouping of the symptoms, Briand diagnosed the case as due to syphilis and put the patient on large doses of potassium iodide, when, under treatment, the patient be-

gan to improve, at first mentally and then physically, and at the end of a year was able to leave the asylum in an almost absolutely normal state, slight weakness of the left leg being the only reminder of the former trouble. The only possible clue to her infection was the fact that her husband had served in the army in Algeria, and at one time early in their married life he had been taking medicine secretly. There was absolutely no sign or symptom of syphilis on the patient's body.

Gilbert and Lion⁵⁵, designate as direct effects of syphilis in the spinal cord the following alterations: Arteritis and phlebitis, embryonal infiltration of the meninges and their intra-medullary prolongations, gumma and hyperæmia, with dilatation of the vessels. Softening and sclerosis are evidently secondary lesions: the former due either to anæmia or to hyperæmia with hæmorrhages following obstruction or obliteration of the arteries, the latter a final stage of softening or the result of embryonal infiltration and gummata.

Silex⁴¹, reports a case in which grave disturbances of the central nervous system occurred within a year after infection. After an attack of paralysis, a small, painless knot appeared in the upper left eyelid. On eversion the eyelid disclosed a dirty-yellowish ulcer, and on the cornea extensive loss of substance from no assignable cause. Silex thinks that specific disease of the brain led to apoplexy and brought about the ulcerous condition of the mucous membrane of the eye.

Neumann and Konried,⁸ _{No. 19; May 13}², after examining the blood in the different stages of syphilis, arrived at the following conclusions: 1. In the primary stage of syphilis the amount of hæmoglobin is diminished (about 15 to 20 per cent.). This reduction continues constant during the first stage, but the amount of hæmoglobin returns to normal under specific treatment. 2. In untreated secondary syphilis of long standing there is constant reduction of hæmoglobin, which fluctuates between 45 and 75 per cent., and which improves under specific treatment, but does not return to the normal. 3. Diminished hæmoglobin is eminently characteristic of tertiary syphilis; in no such case was the normal amount observed. Here, too, treatment produces an increase, but not to a considerable amount. 4. In regard to the red blood-corpuscles in the primary stage, there appears to be no diminution, but as the

constitutional symptoms develop they diminish to one-third of the normal. Under specific treatment they return to normal, but excessive doses of mercury diminish them afresh. 5. Untreated secondaries uniformly show a diminution of the red corpuscles to a third of the normal; treatment brings the number back to normal, unlike its influence on the haemoglobin at the same stage. 6. In the tertiary stage the syphilitic virus causes a constant reduction in the number of the red corpuscles, which reduction also can be restored to the normal by specific treatment, unlike the case of the haemoglobin. 7. The number of white corpuscles during the disease rises parallel with the decrease of the red, only to return to the normal with the increase of the red.

Gamberini^{507, 57}, adduces the fact that the irritating effect of tobacco, which provokes an especial pharyngitis, may induce syphilitic manifestations, and he therefore cautions syphilitics against smoking. In this connection, he describes a case which proves that cancer of the tongue may develop, without being influenced by the syphilis, in a patient who had been previously syphilitic. In such cases antisyphilitic treatment is injurious to the neoplasm. As a criterion of the two forms of disease, the author points out that, while syphilis attacks the surface of the tongue, carcinoma destroys the edges.

A case of syphilitic lesion of the tongue was noted by Alexander,²⁴⁵ in which the papillæ were very large and prominent, the surface cracked and seamed, especially on the right side. It was painful at times, and patches of erosion appeared occasionally. The patient had chancre eight years previously, and, having been immediately subjected to treatment, the only subsequent symptoms were a few oval condylomata. In the present lesion mercury and the iodides were of no avail. Allen considered it as probably the result of papillomatous growths forming in the fissures, caused by the resolution of a gummatous infiltration, having observed such cases in his own practice.

Elliot²⁴⁵ has observed on five occasions the occurrence of nodes of the hyoid bone in the course of syphilis. The symptoms, of which the patients bitterly complained, were entirely subjective, namely, severe pain in swallowing, or speaking, or from certain movements of the neck and head. The pain could not be definitely located, but was referred to the region of the throat gener-

ally. No indication of disturbance could be discovered, and nothing explanatory of the symptoms could be found until the hyoid region was examined, when in each case the presence of one or more periosteal nodes of the hyoid bone was detected, either alone or associated with a chondritis or epichondritis of the neighboring portion of the thyroid cartilage. The pain and the nodes rapidly disappeared under antisyphilitic treatment.

The subject of icterus and acute yellow atrophy of the liver is discussed by Senator,⁴¹ who thinks, from the analogy between syphilis and the exanthemata, that this jaundice is an exanthem, and holds to the assumption of an inflammatory swelling of the intestinal mucous membrane. Still more important in syphilis is the appearance of acute yellow atrophy of the liver. Engel-Reimer has seen 3 cases; Senator has seen 2; 1 case was entirely cured in spite of the severest illness. Only 9 or 10 cases are recorded.

Hypertrophy of the spleen has been observed by Quinquaud and Nicolle¹⁴ as existing constantly in the early stages of syphilis. To detect this enlargement it is necessary to percuss down the axillary line with the patient in an upright position. Normally, there is no splenic dullness in the axillary line; though exceptionally there exists in healthy persons a zone of dullness about half an inch wide; when this dullness exceeds the width of two fingers hypertrophy may be inferred, which, by the way, is not apparent until from fifteen days to three weeks after the appearance of the chancre; it then progressively increases as the disease becomes general. This augmentation of the spleen persists throughout the secondary period, when it disappears, and in the tertiary stage is no longer to be observed. In malignant precocious syphilis it persists from fifteen to eighteen months or more. It does not appear to be more noticeable in cases where fever is present, and is not modified by treatment. As a point in diagnosis the constant presence of this splenic hypertrophy makes it of almost equal value to glandular enlargements.

Besnier¹⁴ is familiar with splenic enlargement in secondary syphilis, and has demonstrated it at his clinics for the past twenty years. He thinks it a concomitant to syphilitic fever, often accompanied by pain,—one of the syphilitic pleurodynias of which the syphilitic nature and the splenic or perisplenic origin are

hardly ever recognized. [Sée long ago demonstrated the existence of enlarged spleen in about one-fourth of the cases of hereditary syphilis. In acquired syphilis Avanzini found it enlarged in 8 out of 30 cases at Lang's clinic, and Schuchter in 6 out of 22 cases; in both instances, it will be observed, the proportion was about the same as in the hereditary disease. In both acquired and hereditary syphilis the symptom is to be classed chronologically and pathologically with the general syphilitic adenopathy.—J. W. W.]

TREATMENT.

"Whenever we find in therapeutics two views apparently diametrically opposed, each with weighty advocates and opponents, none of whom would decide without cogent reasons, then we can be pretty certain that both sides are right." Thus Jessner²¹ writes with reference to the two distinct camps into which the syphiliologists are now divided. "This schism does not touch the question of drugs, for the antimercurialists really no longer gain any important adherents; nor does it concern the question as to the form in which these drugs are to be applied; we should scarcely be justified in classing as antagonists those who advocate the cutaneous or subcutaneous administration of mercury, or those who advocate soluble or insoluble salts. The question which divides the schools is the continuance of treatment. On the one hand stands the doctrine of continuous treatment, or, more correctly, of chronic intermitting treatment, whose advocates, Fournier in France and Neisser in Germany, carry great weight in number and reputation. On the other hand stand such authorities, mainly German, as Kaposi, Caspary, and others, who advocate mercury, and especially iodine, only when demanded by the clear manifestations of syphilis, and restrict them even then, as far as possible, to local application.

"The advocates of the continuous treatment urge: A chronic ailment demands a chronic treatment. The course of syphilis cannot be calculated; syphilis healed from syphilis latent is scarcely distinguishable. And when to this we add its eminent tenacity and hereditary tendency, we are forced to continue the fight against it as long as possible with the most appropriate known weapons to us. The opponents say: The course of syphilis is for the most part favorable; it often disappears once and forever

with the secondary symptoms, in consequence whereof there is no indication why all syphilitics, indiscriminately, should be treated for years, especially in view of the fact that owing to its slow process of elimination mercury continues its effects very long. The prolonged administration of mercury is not only unnecessary, but even injurious, first, inasmuch as it injuriously affects the nerves and tissues, and, secondly, because it gives no rest to the patient, who succumbs in this struggle between the Scylla of syphilophobia and the Charybdis of hydrargyrophobia."

In regard to intermitting treatment, the arguments which Jessner advances, *pro* and *con*, are briefly as follow: "Where conducted in a careful and observant manner, the prolonged use of mercury is not to be considered harmful physically, but, if viewed psychically, cases must be individualized. The neurasthenic nervous patient must be protected from constant worry over his disease. By continuing treatment the patient is forced to think incessantly of his ailment, to watch himself narrowly, and is always in dread of new developments. Such patients quickly succumb, possibly not to mercury, iodine, etc., but to the eternal anguish and excitation which soon lead to sleeplessness, unrest, loss of appetite, palpitation of the heart, and anæmia. They are freed from syphilis, to be sure, only to fall victims to syphilophobia, to neurasthenia, and to hypochondria. All such must be coaxed out of their syphilis, and only in case of need subjected to treatment. The second and by no means small class of syphilitics comprise those feather-brained creatures who forget their syphilis with the last application of salve, and who, despite all warning, constantly subject those around them to the danger of infection, and after the disappearance of the visible manifestations of the disease do not hesitate calmly to enter the married state. In point of dangerousness they are not inferior in grade to lunatics. To such men the sword of Damocles must be made ever present; to such men the reins and bit of continuous treatment must be applied. The third group comprises those who trudge along the golden path, midway and far removed from the two former extremes, reflecting calmly and earnestly; they do what their physician clearly prescribes without becoming either syphilophobic or neurasthenic.

"On the whole, the continuous treatment is useful, and,

rationally conducted, harmless. It is most especially indicated in the case of light-minded patients, and where danger of transmission by inheritance is threatened; in this latter case even neurasthenia is not a contra-indication. Weighty contra-indications there are in this, as in all therapeutics. To these contra-indications the so-called 'mild' syphilis does not belong, because we are not in the position to decide, from the manifestations present, what will be the future course of the disease, which may only become severe twenty years after its beginning, or, perhaps, only through heredity. The continuous intermitting treatment will be at times adopted and at times excluded, for 'first of all is the man and after that his syphilis.' "

The continuous intermitting treatment, just spoken of as adopted by Fournier,⁸¹ is, briefly, as follows: When the diagnosis has been positively established, a mercurial treatment is prescribed, —0.10 gramme ($1\frac{1}{4}$ grains) of protiodide of mercury daily. This treatment is kept up for about two months, albeit the symptoms of syphilis have entirely disappeared. Thus far the treatment is the same as prescribed by almost every physician. Treatment is now suspended for a month or six weeks, because by this time the patient has become accustomed to the mercury, and further doses would exert but a diminished influence; secondly, and more especially, because by prolonging the treatment there is risk of disordering the digestive apparatus. At the end of this time, with symptoms or without, medication is again systematically instituted. It is the disease, latent as it may be, more than the symptoms, which must be kept before the mind. The second treatment is also maintained for a month or six weeks. (This term of six weeks is empirically fixed as the longest term during which the treatment can be continued without danger to the stomach or possibility of tolerance.) After this a respite of two or three months may be granted without much fear of dangerous symptoms; then treatment is resumed for six weeks, and so on, always preserving the proper intensity of action of the mercury,—four mercurial treatments the first year, three the second, and two, as the case demands, in the third. At the end of the third year intermittent treatment with potassium iodide (mean dosage 45 grains—2.93 grammes—daily) is carried out in exactly the same manner for three years, more or less, as the case demands.

To the opposition which this method aroused at first Fournier urges that it is only a general scheme of treatment which he has found the safest; it is not a hard and fast rule to be applied to every case and unflinchingly maintained. It is, of course, to be modified by circumstances and by accidents impossible to foresee.

[I have recently described this method and made, apropos thereto, the following remarks: "As Taylor says, 'It evidently has not fulfilled the expectation of its originator, for we find that within a few years Fournier writes, "Syphilis is an infectious, chronic, constitutional disease, diathetic like gout and scrofula, and should have a life-long treatment." So, in 1889, he says that in the third year there should be four courses of six weeks each, with respites of equal length, and that iodide of potassium should be taken; in the fourth year four similar courses of six weeks' duration, and in the fifth year three courses.'

"It seems possible that the most convincing argument as to the inefficacy of Fournier's original plan is to be found in this very change of method, as the lengthening of the period of treatment to make it run through life is, apparently, evidence that the intermittent course has frequently failed to produce permanent cures."

—J. W. W.]

Scarenzio⁵⁷ believes that the specific action of mercury over syphilis is not due to any germicidal powers while circulating in the blood, nor any biochemical effect which can neutralize the ptomaines or leucomaines, but rather is it in its stimulating effect upon the excretory apparatus that its power lies. That the circulating infectious material displays a tendency to flow to the secretory ducts we can convince ourselves in parotitis, orchitis, or nephritis, which accompany or follow infectious diseases.

Dymniki,⁵⁷ physician for thirty-six years at the sulphur springs in Busko, strongly advocates the use of sulphur baths, combined with mercurial treatment, in the majority of severe and neglected cases. The assertion of opponents, that the sulphur forms an insoluble salt in combination with the mercury, is quite groundless.

Fournier¹⁰⁰ considers alkaline baths as useless and sulphur baths as contra-indicated in secondary syphilitides. Steam and hot-air baths do not promote the elimination of syphilitic virus, and, furthermore, profuse sweats are very debilitating. Sublimate baths

have a certain curative action, but they are a most inaccurate—nay, even dangerous—means of administering mercury. The healthy skin does not absorb mercury applied in this manner, and, as it can gain entrance only through abrasions in the skin, it is impossible to tell how much mercury is absorbed. Their use should be relegated to exceptional cases, and the baths should then be only of feeble strength. Fumigation is another method of administering mercury, in which the dosage is indeterminable and which may lead to disastrous results, although it is frequently found useful as local fumigations for psoriasis palmaris or plantaris. The hypodermatic method has been found useful in many instances, but, after all, the ordinary administration of mercury by the stomach is most useful and convenient.

Wherry¹⁵ has found the calomel bath rather irregular in its action; if the fumes are inhaled there is danger of too rapid mercurialization; and besides it produces rapid loss of weight and anaemia. All patients so treated must be watched with the greatest care.

The method of fumigation adopted by Lane,¹⁶ a strong advocate thereof, is to have about $1\frac{1}{2}$ drachms (6 grammes) of calomel put in a china bowl about half filled with water; a spirit-lamp is placed under this and the patient, sitting above it wrapped in a cloak, has a deposit of mercury settle all over his body as the calomel is sublimed. He then goes to bed still wrapped in his cloak or remains for an hour wrapped in a blanket. He is advised to remain in-doors and take a fumigation every day or night. This course for six weeks to three months is usually necessary to effect a cure. According to Lane, the local effect of the mercury on any open sore, in addition to the mercury which is absorbed through the skin, makes this one of the most satisfactory and safe means by which the effects of the drug may be induced and regulated. Serious later manifestations are thereby rendered rare. The general health is not affected and the term of treatment is shortened; iodides he does not give except in small doses of $2\frac{1}{2}$ to 5 grains (0.16 to 0.32 gramme).

Tommasoli¹⁷ has continued his experiments of last year⁵⁰⁵ with the hypodermatic injection of sterilized serum from the blood of lambs and calves. He reports thirteen cases manifesting various degrees of secondary symptoms in which the results were entirely

satisfactory. No single patient required treatment beyond three weeks wholly to dissipate or materially modify even the severest syphilitic phenomena, and there was no relapse in any of his cases up to seven months after the treatment. Cotterell,²² acting on Tommasoli's experiments, has tried serum from dogs with decided benefit in two cases.

Experiments in the direction of attenuating the virus of syphilis have been conducted by Pellizzari,⁵⁰⁷ ¹⁵² who, in order to insure the safety of his patients, began first by using sterilized blood-serum from syphilitics in the tertiary stage; next from those in the transitory stage, and finally from those in the earliest stage, making sure in each case that the sources of the serum had not been influenced by mercurial treatment, and that the "globular bodies," wherein probably the virus is contained, were not present in the blood. After daily inoculations with this serum, it was found that all syphilitic manifestations assumed a noticeable benignity and that initial scleroses rapidly cicatrized. The author wisely concludes, however, that the subject must be much more extensively studied before any positive conclusions can be drawn.

Straus and Tessier¹⁴ have observed four cases in which Koch's injection of tuberculin produced a marked febrile reaction in the secondary stage. These investigations were not carried far enough to establish whether this reaction would occur in cases of tertiary manifestations or when only the initial sclerosis was present; which later would be an extremely practical point in the differential diagnosis of chancre and chancroid.

Balzer²¹² favors subcutaneous injection when prompt action is required, the soluble salts being absorbed a little more rapidly than the insoluble. The needle should be detached and, after insertion in the tissues, allowed to remain at least a minute before introducing the mercurial solution, so as to be sure that the fluid is not thrown into a blood-vessel; 0.05 to 0.07 gramme ($\frac{7}{8}$ to $1\frac{1}{8}$ grains) of mercury should be injected each time, with sufficient intervals so that a total dosage of 0.25 to 0.40 gramme (4 to 6 grains) is distributed over thirty to forty days. Cosma⁶⁶⁰ found severe precocious osteoscopic pains yield to hypodermatic injections of calomel when potassium iodide and mercurial inunctions had failed. Under Besnier, in the Hôpital St. Louis, deep hypodermatic injections of the peptonate of mercury seem to have fulfilled all

those requirements usually claimed for each new mercurial solution for hypodermatic use.

Horovitz¹⁶⁹ is in favor of a strong solution of sublimate in the hypodermatic treatment, since in accordance with this method a "mercury deposit" is formed at the points of injection, even when soluble material is used, and the absorption of mercury takes place relatively slowly, if not, indeed, as slowly as in the case of insoluble materials. He uses instead of sodium chloride, in his 3-percent. sublimate solution, an equal amount of absolute alcohol; with this he thinks he obtains a less-painful injection liquid.

Wolf¹⁷⁰ claims to have employed the hypodermatic administration of mercury in a large number of cases with the greatest benefit, and frequently at the request of his patient. He also stated before the Philadelphia County Medical Society (March 8) that at the present day little or almost no mercury is given internally in the principal medical centres of Continental Europe. In cases where there are urgent symptoms, Wolf injects $\frac{1}{4}$ grain (0.016 gramme) corrosive sublimate daily; but where a more protracted and lasting effect is desired, oleum cinereum,—30 per cent. (Lang),—of which he injects 0.1 cubic centimetre ($1\frac{1}{2}$ minims) every week for the first four to six weeks. About twenty-five injections are necessary in the region of the back. White, in the discussion of Wolf's paper, which followed, said that the method of injections is not the method of choice in the medical centres of Europe. He also marveled that Wolf had found that method to be preferred by his patients; according to all other authorities, Fournier among them, the fact was that, while a rapid disappearance of symptoms may be caused, a rapid disappearance of patients is also caused.

The objections to the hypodermatic method of treatment are thus given by White²¹⁰⁸: 1. It is painful, and in many patients excites apprehension and is strongly objected to. The precedent administration of cocaine or morphia, advocated as a means of lessening pain, is in itself objectionable. 2. It is occasionally, though rarely, dangerous, and sometimes rapidly fatal. 3. It is liable to be followed by certain local complications, such as erythema, painful nodosities, cellulitis, abscess, sloughing. While the percentage of these troubles is small in the reported cases, it must be remembered that the bulk of the enormous literature on this sub-

ject accumulated in the last decade has been contributed by partisans. 4. It cannot be carried out by the patient, but requires the constant, albeit infrequent, intervention of the surgeon.

The advisability of using soluble or insoluble salts by hypodermatic injections is hardly worth discussion; in the end it amounts to the same thing; when we inject the insoluble salts we merely leave the chemistry of their transformation into the soluble compounds to the tissues themselves. From the claim that a cure is effected by a few injections in several weeks or months, instead of years, it would seem that mercury given hypodermatically acquires some new and powerful curative property which it does not possess when given in other ways. When we *inject* mercury we are simply reaching the general circulation by a somewhat more direct method than when we administer it through the capillaries and absorbents of the skin or gastro-intestinal tract.

This method has not found advocates among the leading syphiliographers of the world; Fournier, Hutchinson, Kaposi, Neumann, Mauriac, Taylor, and many others favor administration of mercury by inunctions, or by the mouth, rather than by hypodermatic injection. It is, therefore, safe to assert that the hypodermatic treatment of syphilis has not as yet shown results which warrant its adoption to the exclusion of other methods, or in preference to them; but, on the contrary, has some insuperable disadvantages, and even dangers, which render it improbable that it will ever be so adopted. [Further investigation has not led me to modify the above opinions.

—J. W. W.] Hutchinson ⁸⁰⁸_{Oct. 1878} advocates the vigorous use of local remedies, together with mercury and the iodides, in the treatment of phagedena. He does not agree with those who attribute phagedena to the use of mercury. Kraus ²⁸³_{Aug. 1878} found great virtue in a 50-per-cent. ointment of the sesquichloride of iron, in a case of obstinate ulcers on the hands of a syphilitic patient who had been bitten during a scuffle. More progress was made in forty-eight hours after the first application than in the previous three and a half months' treatment. He does not claim any specific antiluetic properties for the sesquichloride of iron, but recommends its use in all cases where ulcers show feeble powers of healing. It still remains to be seen what effect the drug would have on purely syphilitic lesions. In the above case the ulcers were in part due to microbic infection from the bites. Swertschkow ^{586, 678}_{Nov. 1878, Jan.} finds that

inveterate or obstinate syphilitic ulcers are best treated as follows: The lesion, first cleaned with 2-per-cent. solution of hydrogen peroxide, then dried and covered with a piece of wool soaked in a 1-to-2 mixture of carbolic acid and camphor, the dressing changed two or three times a day. In a few days the ulcer becomes cleaner and studded all over with healthy granulations. After this it should be dressed twice daily, either with a 1-to-4 mixture of aristol and vaselin-oil or with dermatol and vaselin equal parts, and covered with a large piece of mercurial plaster. Rapid healing ensues in from thirty to forty days, according to the size of the ulcer.

Welander⁵⁷ recommends that, in order to obtain more rapid and more thorough absorption of mercury, a large quantity of the ointment should be applied in one spot, so that what cannot be rubbed into the skin is evaporated, and thus absorbed by the lungs and by the skin at a proper temperature. He found that the amount of mercury absorbed was constantly larger when the mercurial ointment was simply smeared on and left without washing than when it was rubbed into the skin.

Instead of the ordinary blue ointment commonly used for inunctions, Watraszewski²⁹⁷,⁸⁰ strongly advocates a soap made by mixing calomel, in the form of vapor, with a potash soap in the strength of 1 to 2 or 1 to 3. This soap is a soft, whitish mass, odorless, and not irritating to the skin, and has been found to be as efficacious as blue ointment. Inunction is made after a full bath, the patient rubbing in the lather formed with the calomel soap and water, in whatever portion of the body seems best. It is claimed for this preparation that it does not soil the clothes, and has no odor, thereby insuring secrecy in the treatment.

Reynolds²²⁴ recommends, "if justifiable," the excision of the chancre as a proper and beneficial treatment, stipulating only that the sore be excised before the general system becomes infected [a point never yet decided], which is, he thinks, before the induration is manifest, and before the inguinal glands become affected. McGuire¹, has in several cases tried excision of the primary lesion without in the slightest degree affecting the course of the subsequent syphilis. In one case he cauterized with pure carbolic acid an abrasion which had occurred in a coitus only *two hours* previously. In twenty days the patient returned with an indurated

chancre at the spot which had been cauterized; this chancre was excised, but in six weeks syphilis developed. There is no reason to suppose that the virus of syphilis differs from all other virus. Remault inoculated horses with glanders, and one hour after excised the part and applied the actual cautery, yet the animals died of the disease. If we are to hope for any benefit in this direction, according to McGuire, it is to be obtained not by excising the chancre, but by cauterizing or excising the point of inoculation, and that within a few hours after the suspicious coitus.

Farnum, of Chicago,¹⁹² recommends a "simple symptomatic treatment" for syphilis. For the initial lesion he uses as a dusting-powder subnitrate of bismuth or carbonate of magnesia. If the pulse is increased he gives full doses of veratrum every three hours; if the patient is nervous, gelsemium is added. For lymphatic enlargement, phytolacca; for the eruption, berberis aquifolium; for aching in the joints, acetate of potassium; for headache, acetanilid or bromide or iodide of potassium. He treats syphilis in the same manner as any other affection. "A simple treatment is always best; cases have recovered without medicine. Why give iodide of potash as a specific? I have no opinion to give on the use of mercurials." [Which is not, perhaps, surprising.]

CHANCROID.

Krefting^{287 673} v.4, May confirms Ducrey's investigation⁵⁸⁹ concerning the bacillus of chancroid. Attempts at culture prove useless. The micro-organisms are seen in the pustules produced by inoculation. Petersen⁵⁸⁶ n.1, 10 also confirms these observations. The bacilli were found in all fresh typical cases of chancroid in very great numbers, sometimes in groups, sometimes in the form of chains, and occasionally singly in the protoplasm. Krefting concludes that the essential cause of chancroid is the invasion of these micro-organisms into the tissues. Fournier,¹⁷ Apr. 1 although acknowledging the important diagnostic value of the bacillus found by Ducrey and Krefting in the pus of soft chancres, and by Unna in the margins of the lesion itself, nevertheless asserts that we have as yet far from proved that this bacillus is the cause of the lesion, since we are unable to cultivate it on artificial media, and from a pure culture reproduce the chancroid in man. Unna⁶⁹ n. 11 has also observed in sections of chancroid a streptobacillus similar to that observed by

Ducrey in the pus from chancroidal lesions. He has also made certain discoveries, which for the present he retains, concerning the micro-organism of serpiginous chancres.

Nicolle and Venot³¹ employ the bacteriological examination of chancroids as a sure means of differential diagnosis. They describe three micro-organisms which are constantly found in the pus of soft chancres. The pus is smeared on the cover-glasses in the usual manner, and ordinary aniline gentian-violet is used for staining. The three bacteria found are: 1. *Staphylococcus albus*; present to a moderate degree, recognizable by its round shape and the intensity with which it takes the stain. It does not decolorize by Gram's method. 2. A skin bacteria; a bacillus somewhat long, at times isolated, at times two individuals joined end to end. It takes the color throughout its whole extent and does not decolorize. 3. The specific bacillus of chancroid or bacillus of Ducrey, the shape of which is so distinct that it cannot be mistaken. It occurs in three typical aspects: (a) Isolated; this is a stubby bacillus with rounded ends, only taking the coloring at the ends, which give it the characteristic appearance of a shuttle ("navette"). In general, Ducrey's bacillus is this isolated form. (b) In strings, like beads. This is a rare form, especially if the cover-glasses have been rubbed a little too strongly together. These strings are made up of exactly the same bacillus as the isolated form. (c) The massed form, made up of a jumble of broken strings of bacilli. These three forms are sometimes found within the leucocytes and sometimes outside. This bacillus decolorizes.

Coquet⁷⁸⁰ reports a case of multiple genital and perigenital chancroids, and also chancroids of the forehead and scalp, occurring on the same person. Fournier is quoted as saying that cephalic chancroids are excessively rare.

Tommasoli has observed⁵³¹ that the number of buboes following soft chancres were just half as frequent in the months of April, May, and June as they were in September, October, and November. He found, also, that the prevalence of chancroids followed this same course and were just twice as frequent in the autumn as in the spring.

Brousse¹⁴ reports unfavorable results from Welander's method for aborting buboes by injecting 1 cubic centimetre ($15\frac{1}{2}$ minims) of a 1-per-cent. solution of benzoate of mer-

cury, and then applying compression. In five cases thus treated the febrile reaction was intense and no amelioration of the bubo followed. On the other hand, Richter ⁵⁷_{Jan. 25} found the operation useful in thirty cases and highly to be recommended.

Otis ²⁴⁵_{May} is an advocate of the method of subduing suppurating buboes by means of injections of warm 10-per-cent. iodoform ointment into the cavity of the bubo after the pus has been squeezed out through a small opening, and the abscess-cavity thoroughly irrigated with 1-to-1000 sublimate solution. Horwitz ⁵⁹_{Jan. 7} thinks that the early opening of buboes is a mistake; they should be left as long as possible. By this delay a thorough suppuration of the glands and periadenitic tissue takes place, and, consequently, when the bubo is opened there is a more-perfect clearance of the diseased tissue. Incision of the bubo should be made in its entire length, and the overhanging edges of the cavity cut away with scissors. Thus a large, open, suppurating surface of easy access is gained. After-treatment consists of washing with 1-to-1000 bichloride and wiping over the surface pure carbolic acid. In speaking of this method Palmer ²²⁴_{Mar. 11} expresses his opinion that the rapid removal of the diseased glands may be the best surgery, but that it is doubtful if it be justifiable to leave a tell-tale scar, when by prolonging the treatment for a few months the bubo may be healed, leaving only the merest white line where incision was made. He advocates working through a small opening, irrigating with bichloride, curetting, and spraying with peroxide of hydrogen. It is quite possible to curette the roof of the abscess-cavity by reversing the curette. Extirpation of the few enlarged glands cannot be expected to remove all the source of infection. Rodman ²²⁴_{Mar. 11} thinks that the method which Palmer advocates is the very one to produce the worst scars. If the buboes are opened early, and all the glands dissected out and a deep suture inserted, there is not nearly as much likelihood that a depressed scar will remain as when the glands are allowed to suppurate.

Jullien ¹⁴_{Dec. 11} does not favor the indiscriminate opening of buboes and dissection of the glands as soon as engorgement and fluctuation are apparent. In many cases simple buboes which would have been resorbed naturally are converted into contaminated, obstinate wounds. Of course, certain buboes should be opened, but

if the chancroid is about to heal it is worth while to delay a few days, until that focus of infection is done away with.

In the treatment of chancroid Kopp¹¹⁶ has found most satisfactory results following the use of europhen 1 part and boracic acid 3 parts, used as a dusting-powder. Suppurating buboes, after being opened, curetted, and disinfected, were rapidly healed by means of a tampon impregnated with europhen and boric acid, 1 to 5. Bauer⁶⁵ strongly recommends campho-phénique for chancroids. The ulcer is first scraped with a blunt curette and campho-phénique applied freely every day until the ordinary manifestations of repair show themselves, when a bland dry powder, such as bismuth subnitrate, will answer all further therapeutic purposes.

Cavazzani¹,_{ap.} reports thirty-six cases of chancroid healed in from two to eighteen days with a mixture of chloral hydrate, 5 parts; camphor, 3 parts; and glycerin, 25 parts. Brocq²⁴⁵ advocates irrigation with a hot solution of boric acid night and morning and applications once a day of 1-to-20 nitrate-of-silver solution; then dressing carefully and protectively with iodoform.

ORTHOPÆDIC SURGERY.

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SPONDYLITIS.

Courtin ¹⁸⁸ ~~Aug.~~ reports a case of dorso-lumbar spondylitis in which a rapid cure coincided with the injection of camphorated naphthol. The patient had a large abscess, which was aspirated and then washed out with warm boric-acid solution; 300 grammes ($9\frac{1}{2}$ ounces) of a mixture containing 1 part of beta-naphthol, 2 parts of camphor, and 3 of alcohol (90°) were then injected into the cavity, 100 grammes ($3\frac{1}{4}$ ounces) of the solution being subsequently drawn out. A similar operation was repeated on four occasions some weeks apart. After the last of these a fistula formed, from which some necrosed bone escaped. Six months later this closed and the patient remained cured, walking without support and free from pain. In a second case Courtin injected 120 grammes (4 ounces) of a similar solution into a cold abscess inside the pelvis in a girl of 8 years. This was followed by difficult breathing, syncope, coldness, and a feeble, irregular pulse; but after an hour, and the use of subcutaneous injections of caffeine, friction, and artificial respiration, she revived. In the *Annales d'Orthopédie* a number of cases are reported of a similar character, showing that great care must be exercised in the injection of large quantities of camphorated naphthol. In several of the cases the alarming symptoms ceased on freely opening the abscess and washing out, with hot water, the remaining naphthol.

Noble Smith, of London, ²⁶ ~~Sept.~~ enumerates the causes of lateral deviation of the spine in Pott's disease as witnessed by him, as follow: 1. General weakness. 2. Spasmodic muscular action. 3. Those occurring independently; as, for instance, in cases where one leg is short. 4. Lateral loss of substance by the caries predominating upon one side. 5. Other unusual causes.

Phocas, of Lille,⁸⁵⁸ reports three cases of Pott's disease, in which the differential diagnosis from lateral curvature was made with difficulty,—in one case, in fact, not being made until the boy had been exercising for some time with a view to overcoming his lateral curvature, which proceeding was followed by pain in the legs and the appearance of a knuckle in the dorso-lumbar spine. He calls attention to the fact that Bouvier, in 1856, spoke of the possibility of confounding these two conditions, and said that he had committed the mistake himself in his early practice.

Kraske^{892, 242} reports the case of a boy, aged 13, who had been operated upon one and one-half years ago, by trephining the vertebral column, for abscess in the vertebral canal. Paraplegia was, at that time, complete. Three vertebral arches were resected and a tuberculous abscess with sequestra of bone was found. The cord was drawn to one side, and, after emptying the abscess by spooning, was returned to its place, normal position and pulsation being obtained. Shortly after the operation the functions of the bladder returned, so that catheterization was no longer necessary; mobility and sensibility returned gradually, and after fourteen days improvement was very noticeable. Later, however, depreciation began anew. A supplemental deviation of the vertebral column was treated by extension, with good results. After remaining stationary for some time, the symptoms have, in the last few months, shown great improvement; so that the patient, whose wound has entirely healed, can go about with the aid of a corset-support. Kraske says the number of cases in which such procedures are applicable are relatively small; and in those only where compression is not due to acute angle in the vertebral column, but where it is due to tuberculous exudate in the vertebral canal. In this direction Kraske holds the appearance of positive *root symptoms* at the inception of paralysis of much diagnostic worth; their presence indicates exudation, and is against angular compression. He demonstrated that compression of the nerve-roots through kyphotic deviation cannot take place, and sudden paraplegia may be due to acute curvature.

The operation has, under all circumstances, some weighty objections, as the primary process in the bodies of the vertebra cannot be made out with any claim to certainty. Then, the removal of the vertebral arches takes away important support of the vertebral

column, so that deviation can and is apt to follow. Going about is only possible with a suitable corset. Kraske concludes that the operation of resection or trepanation is justifiable only when, by other treatment, the paralysis continues to increase, especially that of the bladder and rectum.

S. Lloyd, of New York,⁹⁶ has collected details of seventy-five cases of Pott's paraplegia treated by laminectomy. From the study of these cases he has come to the conclusion that laminectomy should be performed (1) when posterior spinal disease has been made out as the cause of paraplegia; (2) when the lesion seems to indicate the failure of mechanical treatment,—namely, where dislocation has occurred, or where a sequestrum is causing the compression; (3) when, during the employment of intelligently-applied apparatus, the symptoms continue to increase in severity; (4) when, after a certain period of careful mechanical treatment,—say eighteen months,—the condition has remained stationary; and (5) when pressure-myelitis threatens the integrity of the cord. The operation, he says, is contra-indicated when there are other complicating tuberculous lesions, and when mechanical treatment has not been applied. When sinuses lead down to or can be safely straightened so as to allow the probe to explore the abscess-cavity with which they communicate, the author advises that they should be enlarged so as to provide free drainage, and, if sequestra are present, that they be removed. The statistics of the cervical cases are slightly less favorable than in other regions, but the dangers to life without operative interference are greater still. One cervical case died from inhibition of the phrenic nerves; hence, lesions at the level of the third and fourth spinal nerves are particularly dangerous to life. In these cases, however, pachymeningitis is liable to extend upward, and, by pressure, causes respiratory difficulties; hence, when any symptoms of inflammatory conditions of this part of the cord occur, it is advisable to perform an operation.

Ridlon, of Chicago, and Jones, of Liverpool, speaking of the treatment of spondylitis by the plaster-of-Paris jacket,⁷⁷⁹ state that "the opponents of the plaster-jacket treatment have asserted, on the one hand, that, by suspension, the carious surfaces are separated and the patient's life thereby endangered; and, on the other hand, that suspension was of no use, inasmuch as it did not straighten the spine at the area of disease, but only apparently elongated it

by straightening the normal curves. It appears to us that neither of these objections has any foundation in fact. There seems to be no evidence that separation of the carious surfaces by proper *partial* suspension has ever been of the slightest harm to the patient; and it has not been claimed by the advocates of suspension that it would straighten the curve of disease after reparative consolidation had at all advanced. Portions of curvatures and whole curvatures due to involuntary muscular spasm, and angles due to loss of bony tissue in the vertebral bodies before any considerable reparative action has taken place, can be in a measure, and sometimes totally, rectified by well-judged and carefully-executed partial suspension.

"The plaster jacket can, of course, be applied without suspension of the patient, but, unless the spine be put in the position of greatest comfort to the patient, the object for which the plaster jacket was designed is not attained, and failure to gain good results should not be accredited to the jacket treatment. Surgeons are much too prone to modify methods and mechanical appliances before duly appreciating the principles of the apparatus which they ingeniously 'improve' and tag with their names. It is safe to say that, of the thousands who have used the plaster jacket in the treatment of spondylitis, very few have ever given due thought to the teaching of Sayre,—to 'suspend the patient until the point of entire freedom from pain is reached, stop there, and at once apply the jacket.'"

Sayre had told one of the authors quoted that a patient had been killed in Berlin by the breaking internally of an abscess-wall during *complete* suspension with weights attached to the feet, and during chloroform narcosis. One of the authors can confirm this by his experience in two cases, neither of which was published. He was called to see a patient who had returned home from one of the hospitals after having been suspended during the application of a jacket for an upper dorsal curve. The patient, who had been perfectly well up to that period of suspension, died two hours after leaving the hospital, after complaining of pain in the limbs and suffering great respiratory difficulty. In another case paraplegia resulted suddenly, being almost complete in twenty-four hours. In both these cases suspension was too complete, although in each case a surgeon of repute superintended the application.

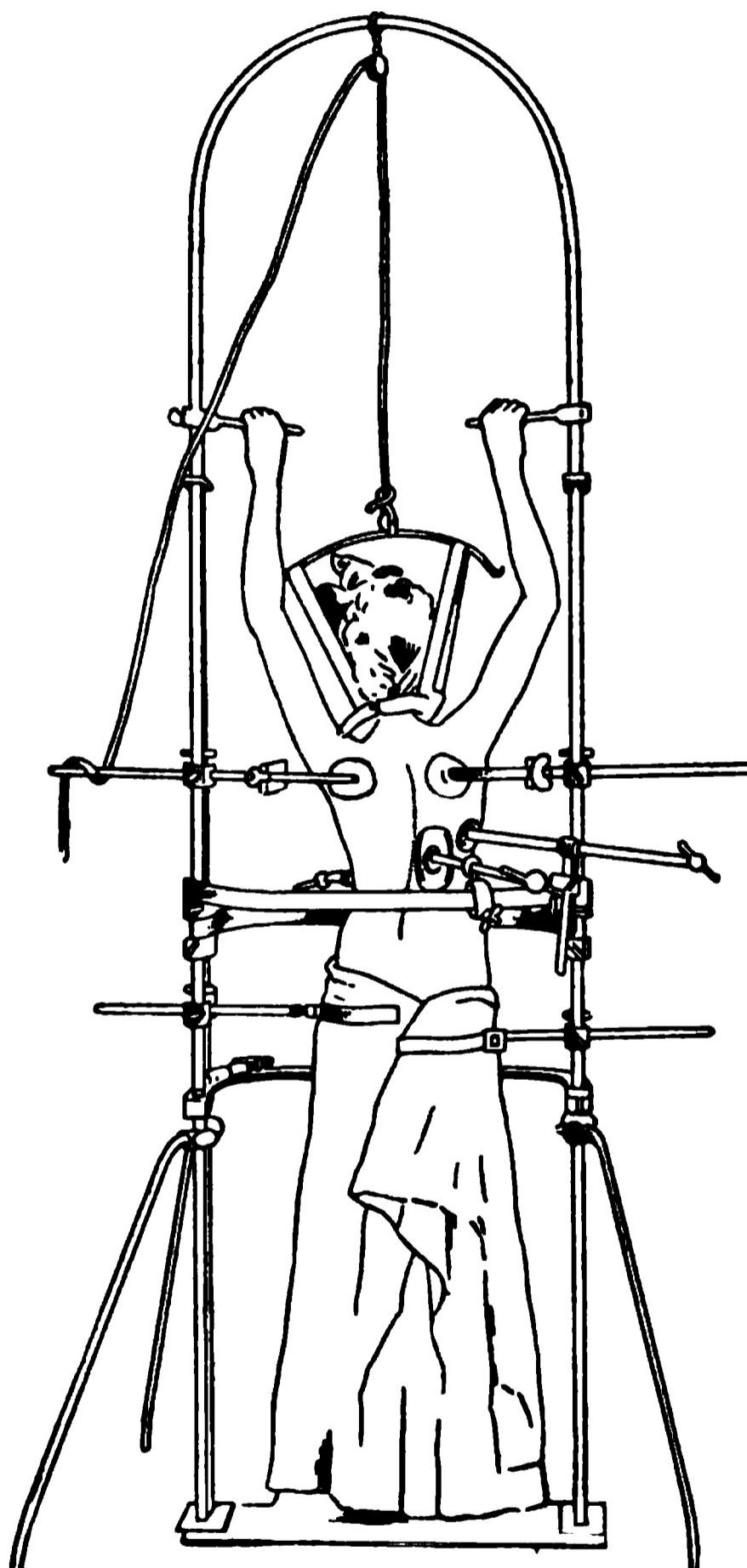
LATERAL CURVATURE.

Nothing new has been suggested in the treatment of lateral curvature during the past year, but Bradford and Brackett, of Boston,⁹⁹ give the results of their treatment by forcible replacement and the use of plaster-of-Paris jackets, applied while the deformity is corrected.

The apparatus they use is similar in principle to Hoffa's, and consists of uprights, to which are attached clasps holding the pelvis and shoulders fixed, after the spine has been stretched as far as possible by means of a head-swing and pulley, the hands meanwhile holding on by small handles. While the body is thus stretched, pressure is made on the prominent ribs at various places in front and rear by means of pads operated by screws, which are attached to rings passing around the patient and secured to the uprights, as shown in the cut.

This method of correction is also supplemented by pressure made in a similar way with the patient in a horizontal position, and continued for half an hour at a time, as shown in the cut on the next page.

In addition to the use of the appliance to correct the curves of the spine and render it flexible, it can be used for the purpose of fixing the patient in a thoroughly-corrected position, or as near so as is practicable, while a plaster bandage is applied to the patient in that position. It would at first seem impossible to place a



PATIENT IN POSITION IN CORRECTING APPARATUS. (BRADFORD AND BRACKETT.)
Boston Medical and Surgical Journal.

plaster jacket on a patient whose thorax has been corrected by forcible pressure. It will be found, however, that if this is done with care, the pressure being increased gradually, a marked improvement in the distortion of the thorax may be obtained. The patient should be placed in as nearly a corrected position as possible by means of the appliance already described, and the plaster jacket applied in the usual way, except that the bandages are wound about the trunk, avoiding the screw-pressure rods. The patient's skin is protected under the points of pressure by pieces of saddlers' felt, and even pressure is secured by thin, steel plates, which are incorporated in the bandages. The plaster corset is worn for a week or a fortnight, when another can be applied in a similar way, with a slight increase of the pressure if practicable. It is, of course, pos-

RECUMBENT CORRECTING APPLIANCE. (BRADFORD AND BRACKETT.)
Boston Medical and Surgical Journal.

sible to apply enough pressure to render the jacket unendurable; but, short of this, it will be found that a substantial amount of pressure can be borne without more discomfort than that attending any jacket. If the jacket is split and removed, the amount of correcting pressure is diminished, even though the split jacket be well laced afterward. If the greatest amount of correction is sought for persistently, the fixed bandage is to be preferred.

If a jacket is applied in this way, it is necessary that it should be a thick one, as a light bandage does not quickly become sufficiently strong to resist all downward pressure after suspension. If a lighter bandage is desired it can be obtained with a sacrifice of but little correcting efficiency, if the jacket applied, as has been mentioned, is removed when hard. From this a cast is made, dried and shellacked. Over this a second jacket can be made, which,

when thoroughly dry, is cut and sprung around the patient (suspended in the ordinary way), and secured by an additional plaster bandage. This method of application of the jacket saves the patient the discomfort of a moist plaster jacket.

After as much of correction as can be gained in this way, the removable corset can be substituted for the fixed one. These can either be of plaster, leather, wood, or, as the writers prefer, of paper and starch. The casts made from the jacket can advantageously be altered in shape by building up and shaving off, so as to increase the amount of local pressure where desirable and decrease it over concave parts of the thorax. The correcting appliance can then again be used as a daily exercise as long as is considered desirable; and if further gain in correction is to be accomplished, fixed jackets can be resumed, or lighter forms of corsets used.

The article contains illustrations of patients showing marked improvement. Goldthwaite, of Boston,⁹⁹ also showed a number of jackets taken from patients who had undergone this form of treatment, the jackets showing decided improvement in figure.

R. H. Sayre¹⁰⁰ read a paper before the New York State Medical Association on the treatment of neglected cases of lateral curvature, and showed one of a series of patients whose heights were increased, by suspension and the use of a plaster-of-Paris jacket, from three-fourths to three and one-fourth inches. The boy who was shown was one and seven-eighths inches taller in his corset than without it.

Eklund, our corresponding editor at Stockholm, reports that Ernst Åberg has had excellent result in "*traitement forcé*" of scoliosis. The manifest and immediate effect of this method of forcing the displaced vertebrae, under strong pressure, to move in the right direction under the influence of pressure with motion, that constitutes the essential, novel, fundamental principle in this treatment, is described as being astonishing in the very highest degree.

Hoffa, of Wurzburg,¹⁰¹ describes his appliance for scoliosis, which consists of a corset with bands over the iliac crests, *a*, from which start axillary crutches, *c*. A well-fitting and well-padded ring fits under the chin (*e*) and occiput, opening and closing with a hinge. This ring is supported on four upright rods, *f*, which run

down the front and back of the thorax, and are supported by elastic bands which extend from their lower extremities to the ends of the axillary crutches, b. A belt prevents these uprights from wobbling on the corset, and in proportion as the rubber bands tighten the occiput ring is forced upward, stretching the spine.

APPLIANCE FOR SCOLIOSIS. (HOFFA.)
Münchener medicinische Wochenschrift.

SACRO-ILIAC DISEASE.

Lanphear, of Kansas City,⁷² reports a case of sacro-iliac disease, with immense distension of the abdomen with pus. The disease was of about a year's standing; patient emaciated almost to a skeleton; abscess discharging near third lumbar vertebra. After opening and curetting the superficial abscess, the ilium was trephined, and, only a small amount of pus being obtained, a for-

ceps was pushed through the pelvic fascia into a large abscess. Some days later an incision was made in the abdomen, and the abscess washed out from the front and the sacrum and ilium scraped. During the operation the internal iliac artery was injured, but haemorrhage was arrested by packing the wound with iodoform gauze for four days. The patient eventually made a good recovery.

Bruhl and Soupault³¹ give histories and illustrations of patients evidently suffering from sacro-iliac disease. Schmidt,¹³ describes similar cases under the head of "Ischias Scoliatica." In the past few years a large number of French and German articles

SCIATICA, SO CALLED. (BRUHL AND SOUPAULT)
La Médecine Moderne.

have appeared describing lateral deviations of the spine accompanied by pain in the sciatic nerve on the side away from which the patient leans; and in none of them do the authors seem to have suspected that the cause of the trouble was an inflammation in the sacro-iliac synchondrosis, and the pain a peripheral-nerve indication of joint involvement such as is found in spondylitis or hip disease; although some of them have recognized the fact that the lateral deviation of the spine was due to the patient's efforts to get relief. The history of one patient is typical: he had pain in his hip and thigh, limped, went on crutches, grew better, abandoned

crutches, became worse, resumed crutches, grew better once more, the pain always being increased by exercise and accompanied by night-spasms. The pictures are typical of sacro-iliac disease, and the position has long been so recognized in the United States; but the numerous foreign articles which have recently appeared show that it is not appreciated as thoroughly as it should be abroad.

SPINA BIFIDA.

Nothing new in the way of treatment was suggested during the year, but successful cases treated by aspiration and injection are reported by McCullough, of Dublin,²² and cures by excision are reported by several observers. Walther¹¹⁸ reports a case on which he operated when the child was 4 hours old. Having aspirated the fluid with a capillary trocar, the sac was dissected out and the opening closed with sutures. Eighteen months later the child was in good condition and learning to walk. Ricard⁹⁰⁸ reports a case of large spina bifida, in a young woman aged 25 years, accompanied by convulsive seizures and syncope, which he cured by excision. After the neck of the sac was made bare it was clamped, but convulsions of the lower extremities immediately ensued; so the clamp was removed. The sac being then opened, nervous filaments were seen, some branching over the surface of the sac and others bent back, to again enter the spinal canal. The first were cut through, the second were returned; the sac was then cut away and the incision closed with catgut sutures. Perfect recovery ensued after the removal of a small quantity of liquid on two occasions by tapping.

Sulzer⁷⁶⁸ reports a case treated by incision which died of acute meningitis. He found the lumbar cord divided into two longitudinal parts completely separated, which reunited lower down to form the filum terminale. The separation seemed to be caused by an exostosis which divided the spinal canal in half. Monod²² reported a case treated by excision, in which he cut off a nerve that he was unable to push back into the spinal canal. Although the section was followed by no nervous troubles, the child died of dysentery that came on six weeks after the operation. Alfred Hayn¹⁵⁸ published a long article on the diagnosis and treatment of spina bifida, which reviews the literature of the subject very exhaustively.

Borck ⁸⁶⁴_{Mar. 1} objects to the cases published as cured as being reported too soon to be made the basis of reliable statistics, and mentions some six cases of his own which recovered from the immediate effects of operation, but died inside of two years. He thinks that the chances of success are much greater in adults than in children.

TORTICOLLIS.

Dève ⁵⁷⁷_{Feb.} reports the case of a man who, while stooping, was struck on the occiput by a bundle weighing about 90 kilos (200 pounds), which fell from a height of about 2½ metres (8 feet). He was thrown down, and, on rising, his head was bent sharply to the right and backward, and his face turned to the left. It was found that he had ruptured the trapezius and some of the posterior fibres of the sterno-mastoid. A fortnight's rest cured him.

Jules Voisin ¹⁴_{July 28} reports the case of an hysterical girl, 19 years old, who had formerly been epileptic, in whom there appeared every three months a torticollis lasting several days, its onset being preceded by a nightmare. By hypnotic suggestion these attacks ceased to appear.

John Anderson and W. Johnson Smith ⁸²¹_{May} report a case of spasmodic torticollis, cured after excision of a part of the spinal accessory nerve. The patient, a man of 31, had had malaria five years previously in Bombay, and had attacks at intervals since. In other respects he was perfectly well. Two months before admission to the Seamen's Hospital he had had an attack of intermittent fever. Two weeks later slight intermittent movements of rotation began in his neck, accompanied by slight pain in the back of the neck and its sides. The spasms became worse ; the head was twisted from side to side twenty or thirty times a minute ; the mouth was slightly drawn toward the right, while the hands trembled slightly and the knees knocked. Later, the movements only took place in the left sterno-mastoid. The movements were so violent that deglutition was much impeded and he became very weak. Internal medication for some months being of no use, resection of the left spinal accessory was made, and an almost immediate improvement followed ; the pain and the difficulty in masticating soon disappeared entirely, the only trouble remaining being slight movements of the neck when using his right hand.

Noble Smith ⁶_{Aug. 28} reports five cases of spasmodic torticollis

treated by excision of nerves, in only one of which a relapse occurred. In this case the spinal accessory on one side had been cut with result of arresting all spasms, although both sides of the neck and the facial muscles had been involved. After the lapse of several years, however, the spasms are beginning to recur in the muscles of the side not operated upon. In some cases the upper posterior cervical nerves were divided, as well as both spinal accessories, and a great number of muscles in the neck consequently paralyzed, but the patient was not very much inconvenienced thereby.

Wm. Gardner, of Melbourne,²⁸⁵ concludes a series of interesting articles on neurectomy in torticollis, describing several cases in which he resected portions of the posterior branches of the upper three cervical nerves, with complete relief of spasm, the cures having lasted several years when the cases were reported. He first operated on July 18, 1888, excising a portion of the posterior branches of the second and third cervical nerves,—which seems to be the first recorded operation of the kind, Keen's case being published in 1891, though he had published his plans in 1889. Gardner operated through a vertical incision between the trapezius and sterno-mastoid, previous section of both spinal accessory nerves having only modified the spasms, which in part were due to action of the deep rotators of the neck.

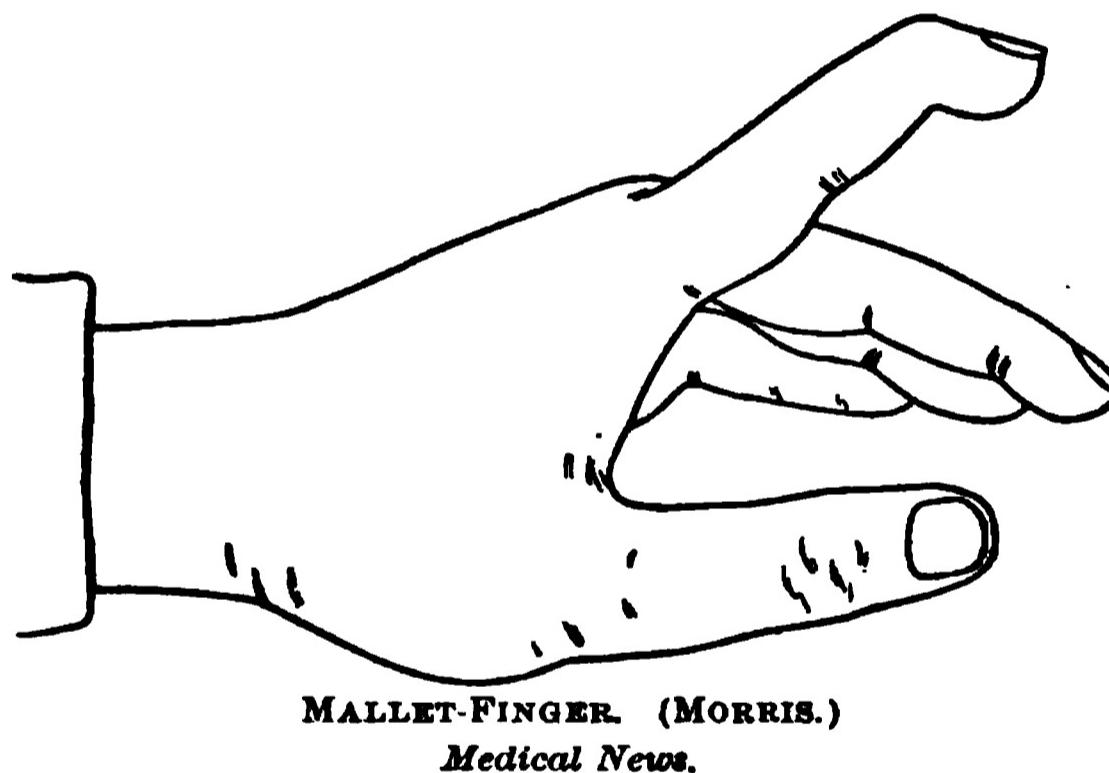
He has also used Keen's transverse incision, but thinks the operation, as described by him,⁹⁶ unnecessarily complicated, and thinks it easier to cut down on and clearly define the suboccipital triangle. The first nerve will be found crossing it, the second will be found outside of the triangle below the inferior oblique, and the third an inch lower down the neck than that muscle. There are certain general considerations regarding the operation which appeared to Gardner advisable to follow in working out the details of operative procedures in these distressing cases: 1. The operation on the spinal accessory nerves should precede, by a considerable interval, the difficult operation on the cervical nerves, for two reasons: (a) because the milder operation has been known to be successful, even in cases in which movements occurred in muscles not supplied by the spinal accessory nerves; (b) because the trapezius being completely paralyzed after the neurectomy of the spinal accessory nerve, time is also given for a more complete

study of the muscles involved in the spasm, and in this way unnecessary operations, with their risk and resulting scars, may be avoided. 2. If the sterno-mastoid is involved in the spasm the spinal accessory nerve should be cut down upon anterior to that muscle, but if the trapezius alone is involved the nerve should be sought for by an incision along the posterior border. In neither case need the incision, if properly placed, exceed two inches in length. 3. No injury to the patient will arise from the paralysis of muscle, from the point of view of function. From an æsthetic point of view, it is of advantage that the extent of the spasm should necessitate an operation on both sides, as thereby dissimilarity in the appearance of the right and left muscles is avoided. 4. The neuralgia which follows section of the nerves is especially felt in the shoulders, and appears, so far as my small experience goes, to be of very fleeting character. 5. The spinal accessory nerves may both be cut down upon at the same time, as the whole operation can be done with precision in about fifteen minutes. In the case of the posterior cervical nerves the two sides should never be done at one operation, because the duration of the double operation might seriously increase the risk to the patient, or the onset of dangerous symptoms might necessitate the second operation being left unfinished.

HAND.

R. Harcourt Anderson, of New York,⁵⁹ describes an operation for improving the mobility and flexibility of the hand in piano-playing. About an inch below the palmar fascia, at the web of the fingers, there exists a strong band of transverse fibres that give strength and force to the web of the fingers and support the hand crosswise. They sometimes exist so very low down that one finger cannot be flexed without carrying its neighbor with it. Some of the fibres pass across the hand, others part way, while others only arch from one finger to the other. These last pass down on the sides of the fingers, uniting with the lateral digital fibres of the palmar fascia, while others pass directly down the middle line of the first phalanx in the subcutaneous tissue; they reach the base of the second phalanx, split astride the flexor sheaths, to be inserted into the side of the base of the second phalanx (Gray). These are the so-called fibres of Gerdy. The function of these fibres is, as

before stated, to support the hand crosswise, but they also are accessory in action to the palmar interossei in adducting the fingers, and it will be readily understood that if these fibres are contractured, or if they exist lower down than usual, the phalanges cannot be abducted to their greatest extent. A professional pianist coming for treatment, he found, on examination, that the webbing between the third and fourth fingers existed about one-eighth of an inch lower down than normal, thereby materially interfering with extreme abduction and stretching of the fingers. After cutting off the circulation at the wrist and injecting a 4-per-cent. solution of cocaine, he made an incision through the integument parallel with the long axis of the third and fourth fingers, and midway between both. It extended for one-fourth inch from the extremity of the webbing



on both dorsal and palmar surfaces. The layer of fibro-adipose tissue beneath the integument, and covering the fibres of Gerdy, rendered accurate dissection difficult; he therefore removed a small portion, and, coming to the fibres of Gerdy, divided them, thus lengthening the measurement from the tip of the fingers to the webbing. Caution was needed to prevent division of the nerve-branches. The result of the operation was a vast improvement in freedom of motion and in flexibility.

Mallet-Finger.—Robert T. Morris, of New York,^{supt.}, describes a new method of correcting this deformity, which is caused as follows: When the extensor tendons of the fingers are tense, a blow upon the end of a finger, transmitting force in a direction which would ordinarily flex the finger, results in injury to the extensor tendon in the vicinity of its attachment to the dorsal surface of the

last phalanx. The injury consists not in a bodily separation of the tendon from its points of attachment, but rather in a thinning of the tendon cephalad from the principal point of attachment to the phalanx, and from the fibres that form the posterior ligament of the last phalangeal articulation. A few fibres of the tendons are undoubtedly ruptured, but most of them slide away from each other, very much as the threads of a textile fabric separate when the fabric is violently stretched but not torn, the structure retaining its original general appearance. The tendon is repaired without much difficulty by making a longitudinal incision, two centimetres in length, over the site of the injury, dividing the thinned tendon longitudinally into the two principal fasciculi into which it naturally separates, dividing the tendon transversely, cephalad from the thinnest point, and advancing each fasciculus to a point upon its own side of the finger near the base of the finger-nail. At this point the fasciculus is sutured to the under surface of the skin with a suture which passes through the skin and is tied upon the outside. The fasciculi are sutured to skin rather than to periosteum and tendinous remains, because the former structure affords a firmer hold, and the cut end of the tendon makes as good union with the phalanx as it would if sutured directly to periosteum.

Lateral Deviation of the Digital Phalanges.—Joachimsthal, of Berlin,³²¹ reports a case of congenital lateral deviation of the ungual phalanges of both thumbs in a child 10 years old, who also had congenital club-foot. The mother had the same deformity of the thumbs, though to a slighter degree. The ungual phalanges formed, in the boy's case, angles of 120 degrees and 130 degrees, respectively, with the proximal phalanges, being bent toward the ulnar side of the hand, there being hypertrophy of the radial side of the head of the first phalanx. By the application of force the deformity could be reduced, and the author applied an apparatus to retain the thumbs in normal position, hoping in this way to reduce the hypertrophy of the radial side of the head of the first phalanx, and so secure a normal joint, as is occasionally done in genu valgum when the bones are soft.

[We have seen a similar condition in the feet, and found that it was not possible to keep the toes straight by an apparatus. We were obliged to remove a wedge of bone to restore the relations of the phalanges.—R. H. S.]

Club-Hand.—Reginald H. Sayre, of New York,¹ considers club-hand as very much less frequent than club-foot. It may be acquired as a result of paralysis of certain muscles, or contraction of others from central nervous irritation, by cicatrices resulting from burns; or be due to injuries to the bones of the hand or forearm. It may also be congenital.

Of the first variety, J. K. Young² reported a case where an infant had the left side of the head injured at birth. A large hæmatoma formed in this location, and subsequently the right hand was markedly adducted, the fingers and thumb flexed, and the hand flexed at the wrist almost at a right angle with the forearm in the radio-palmar position. The hæmatoma was incised; profuse bleeding followed, and subsequently the deformity gradually subsided, having been caused by the irritation produced by the hæmatoma.

Bilhaut³ reports a case of club-hand due to fracture of the ulna at birth, with subsequent loss of bone from suppuration, giving rise to inequality in the length of the bones of the forearm, and causing a sharp deflection of the hand toward the ulnar side.

The congenital club-hands differ widely from the above-described cases, and may be divided into three varieties: (1) those where the skeleton is complete and well formed; (2) where the skeleton is complete, but badly formed; and (3) where the skeleton is incomplete and distorted. Various writers say that the majority of cases come under the third head, but the author's personal experience does not agree with this. In many cases club-hand is associated with club-foot, or some other abnormality of development. The direction of the deformity may either be in flexion, extension, abduction or adduction, or a combination of the two, the most frequent being the radio-palmar variety.

In those cases in which all the bones of the hand and forearm are present, the prospects of a good result are more favorable than where there is an absence of one or more bones. In these milder cases, when seen early, it is sometimes possible to restore the hand to proper shape and function by constant manipulation and rotation of the parts, which are to be held in their improved position by some fixed dressing, as the plaster-of-Paris bandage, changed from time to time as the deformity is reduced.

Section of the tendons, ligaments, or fascia may be necessary,

if the case is not seen in the early stages. Many of these structures are so situated as to make open section preferable to the subcutaneous method. If the flexor tendons have to be divided, it would seem better to operate in the forearm instead of the hand, and to split the tendons longitudinally, and, after having gained the required additional length by sliding the ends past each other, to suture them together once more.

In an aggravated case of congenital club-hand and club-foot of the right side, associated with lateral curvature of the spine, operated by the author, the hand was almost the counterpart of one described by Kirmisson and Longuet,⁵⁵³ and which they had

CONGENITAL CLUB-HAND. (SAYRE.)

B., biceps, whose tendon passes in front of the elbow to join the muscles of the forearm; *CB.*, coraco-brachialis; *Br.*, brachialis anticus; *Tr.*, triceps; *R.*, flexor carpi radialis; *G.P.*, palmaris longus; *Po.*, *Pp.*, superficial and deep flexors; *M.*, median nerve; *C.*, ulnar nerve. (After Kirmisson and Longuet.)

New York Medical Journal.

an opportunity to dissect. The radius and thumb were absent, as well as the first metacarpal bone and a certain number of the carpal bones.

In Sayre's case the ulna was curved in its middle at an angle of about thirty degrees toward the side where the radius should have been. The hand was almost at right angles with the forearm, bent toward the radial side and flexed on the forearm. The carpus did not articulate with the ulna, but was attached to it by means of firm, ligamentous bands. An osteotomy was first done on the ulna to correct the curve, and after the bone had united in a straight line efforts were made to stretch the contracted soft parts on the side of the arm where the radius should have existed.

After several weeks of traction the hand could not be drawn far enough down to permit the ulna to slide above the carpus. Through an open incision the ligaments between the ulna and the carpus were divided, the intention being to form an artificial joint between the lower end of the ulna and carpus. It was found, impossible, however, to draw the carpus clear of the ulna, and therefore the styloid process of the latter was cut off, the os magnum and unciform removed, and the end of the ulna put into the gap in the carpus thus formed. The bones were not wired in this position, with the idea that the hand might be more useful if this were not done; and it being, of course, feasible to wire the bones later on if it should be deemed necessary. The shortening of the extremity, caused by the removal of this amount of bone, seemed preferable, to the author, to the very extensive division of tendons and muscles which would have been necessary to permit the carpus to be pulled down. The hand is now approximately in line with the forearm. There is free motion at the wrist, and the ability to grasp objects is greater than it was before the operation; although extension of the hand on the wrist is poor, absence of the radius making a very imperfect joint. (See illustrations.)

In cases like that described by Bouvier, which is in the Dupuytren Museum, where such carpus as is present articulates with the ulna, on the side where the radius should have been,—the radius being absent,—the proper operation would seem to be the division of the ulna just above the articulation with the carpus, and then to turn it at right angles, letting the outer surface reunite with the end of the ulna, and thus bring the hand into a straight line with the arm, at the same time preserving the wrist-joint.

HIP.

Hip-Joint Disease.—The conservative treatment of hip-joint disease is beginning to find favor on the Continent of Europe. Lorenz⁵¹ remarks that it is very important that the patient should have the benefit of sunshine, fresh air, and exercise while the joint is protected by an apparatus that will take off the weight of the body from the diseased joint, and allow the child to exercise in the open air without pain, all of which statements have been received as fundamental in this country years ago. He makes the astonishing statement that the result to be aimed at is

Hand.]

ORTHOPÆDIC SURGERY.

H-19

COXALNTAL CLUB-HAND BEFORE AND AFTER OPERATION. (SATRE.)
New York Medical Journal.

ankylosis in a good position, and recommends enveloping the child in plaster-of-Paris bandages with an extension below the foot as the best means of treatment. The traction splints of various kinds as used in this country with excellent results he discards as useless. Albert and Billroth expressed very similar views, clearly showing that they do not understand the employment of these various forms of apparatus. They both, however, bore testimony to the superiority of conservative treatment over indiscriminate excision.

In contrast to these views, expressed in Vienna, that ankylosis was to be desired, J. K. Young, of Philadelphia,¹¹² reports two cases of hip-joint disease cured with perfect motion, as attested by a committee from the Philadelphia County Medical Society, where the patients were shown, although in one case resection had been advised by an eminent surgeon, as the only means of saving life. These cases were treated by traction without immobilization. The long, portable, traction splint was used, and the patients encouraged to walk as soon as it was securely applied. Traction was continued at all times, the apparatus being worn at night as well as in the day-time. Locally, compound iodine ointment was applied daily, either in the groin or behind the trochanter of the affected side. Constitutional treatment was employed throughout the entire course of the disease, compound syrup of hypophosphites being given in summer and codliver-oil in winter.

Gibney, of New York,²³⁴ gives the results of 90 suppurative cases of hip-joint disease in hospital practice. Of these 90 cases, then, there were 18 that opened spontaneously either at the time of admission or after aspiration. Ten of these, or 55 per cent., did well; that is, the patient suffered no inconvenience; a sinus followed and finally closed. Three, or about 17 per cent., did well also, but a sinus remained. In 5 there was a failure; that is, the discharge grew very abundant, and it was necessary to resort to other procedures. Forty-three were aspirated from one to ten times; and of this number there were 4, about 9 per cent., that proceeded to resolution, and 39 failed, or 91 per cent. Forty-nine were incised and treated as above described, with 22 good results,—about 45 per cent.,—that is, closure of the wound and ultimately of the sinuses. Nine did fairly well,—which means the constitutional disturbance was very slight, the wound closed, and only a

sinus remained. Eighteen failed, about 37 per cent. This leaves 31, or about 63 per cent., that may be set down as successful.

There were 31 cases that were either excised during the past year or are still under observation. Of this number, 18, or 58 per cent., did well; that is to say, the wounds have healed and the limbs are in good position and useful for walking, with very little shortening. In 9 cases the result has not yet been reached, but the prognosis is good, and this would give us a possible 27, which is about 87 per cent. of cases of cure. Four of the 31 cases failed,—that is, the patients either died or are in a fair way to die; and this leaves, then, a mortality of nearly 13 per cent. It is also fair to state that this mortality is obtained in cases where the operation was done more frequently as a last resort and as a life-saving measure. Gibney has not yet come to believe that excision should be done early, although he confesses that, as his experience increases, his convictions are growing stronger in favor of early excision. In a few cases where the operation has been resorted to at an early date the results have been uniformly good, and in some instances brilliant.

Analyzing the 90 cases still further, he finds that in only three instances, where a spontaneous opening of the abscess occurred, was it necessary either to incise or excise. In 1 incision was employed, or, rather, enlargement of the opening with thorough curetting. In 2 excision was performed, with good results in both cases. In 4 instances where aspiration was resorted to, 3 opened spontaneously at a subsequent date, and generally in the cicatrix from the needle; 3 of these were attended with good results; 1 was a failure.

In 16 aspiration cases incision was finally resorted to, with 8 good results, 6 questionable, and 2 failures. In 8 cases, where both aspiration and incision failed, excision was done, with 6 good results and 2 failures; and in 8 other cases where aspiration alone was employed, excision was done, with 4 good results and 4 fairly good results. There were 5 cases, where the abscess had previously been incised, that were finally excised, with 1 good result, 3 fairly good, and 1 failure.

Taking the whole number of cases where aspiration failed,—viz., 39,—36 were subjected to further observation and treatment, with 21 good results, 10 fairly good results, and 5 failures.

TABLE OF OPERATIONS.

Abscesses opening spontaneously	18, with 18 good results.
Abscesses aspirated	43, with 4 good results.
Abscesses incised	49, with 31 good results.
Cases excised	31, with 27 good results.

Gibney also urges the importance of a sparing use of ether by shortening the operation as much as possible. He does not believe it is a good plan to make an extensive operation requiring from an hour to an hour and a half. Such patients, as a rule, may rally from the immediate effects, but will in a short time develop nephritis, and, while the death is not traceable directly to the operation, we somehow feel that if we had given less ether the kidneys might not have become involved.

Vance, of Louisville,²²⁴ reports a case of hip-joint disease with abscess, in which the femoral artery ruptured spontaneously into the abscess by extension of the disease. The artery was ligated, but forty-eight hours later, the leg becoming gangrenous, amputation at the hip was performed. The patient recovered in spite of the fact that he was moribund at the time of operation. In this case there was no drainage-tube employed as in the two cases of haemorrhage reported in the ANNUAL last year, haemorrhage having been feared on account of the proximity of the abscess to the artery. The rapidity of the operation was probably the cause of the successful issue.

Schede, of Hamburg,⁴¹ showed before the Twenty-second Congress of German Surgeons a preparation of a hip-joint on which he had performed resection some years before. It demonstrated that the end of the femur had made a good movable joint in the acetabulum. Schede stated that he had not had a bad functional result in one hundred and fifty hip-joint resections. König testified to the fact that Schede's cured patients walked very well after their exsections.

McCurdy, of Dennison, Ohio,¹⁶¹ describes a splint for use after excision of the hip, which is practically a Thomas splint continued down to the ground behind the leg, with a foot-piece some inches below the foot and an ischiatic bar on which the weight of the patient rests in walking. Adhesive plasters are applied from the thigh to the ankle, and extension on the limb made by fastening their extremities to straps connected with the foot-piece of the splint.

By this means the limb is prevented from becoming distorted during the process of repair in the hip-joint.

A. M. Phelps, of New York,⁵⁹ gives what he thinks is the explanation of the various deformities in hip-joint disease, which he sums up as follows: In the first stage the limb is slightly abducted, outwardly rotated, and flexed with apparent lengthening because of a voluntary effort on the part of the patient to relieve tension of the capsule and Y-ligament. This deformity increases, constituting the second stage of the disease, on account of spasm of the muscles about the hip-joint. The great glutei, outward rotators, tensor vaginæ femoris, and flexors acting together have the advantage of leverage and strength (being irritated and affected by spasm, and aided by a voluntary effort or non-resisting effort of the patient, the same as in the first stage); the limb still exaggerates the deformity of the first stage.

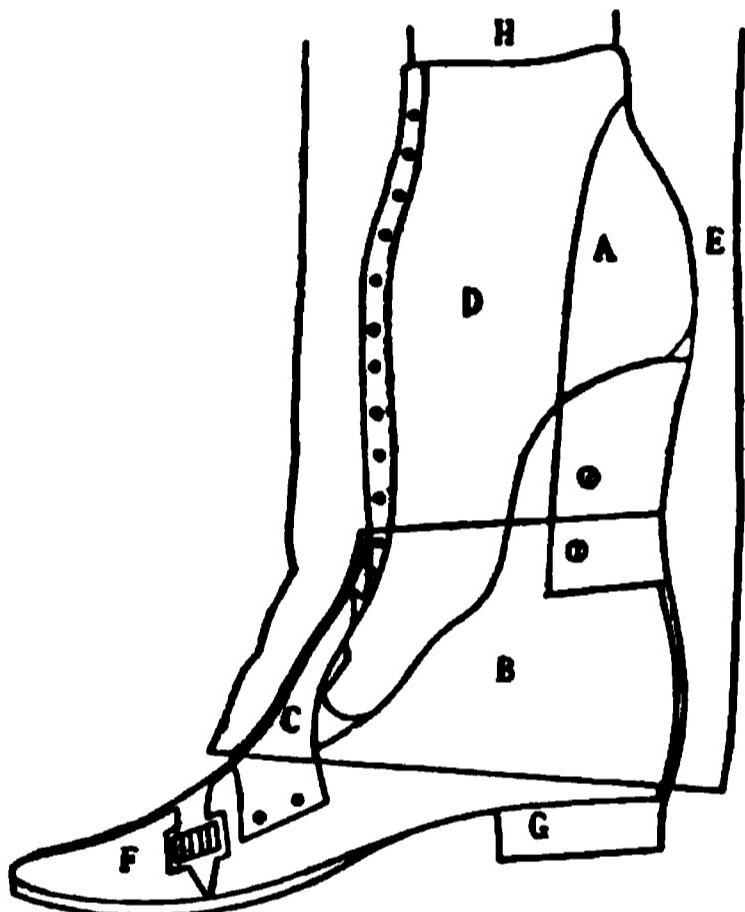
As a rule, with an occasional exception, limbs assume the deformity of the third stage only after flexion to twenty-five degrees has taken place, because, after the limb passes to twenty-five degrees of flexion, the abductors, to a very great extent, become internal rotators; the external rotators almost totally lose their power as external rotators and become abductors, with the exception of the quadratus femoris and obturator externus, and the tensor vaginæ femoris becomes a powerful inward rotator. Resistance or antagonism to the powerful abductors and flexors of the thigh being modified or annulled by flexion, the limb must pass to the deformity of the third stage, namely, adduction, flexion, and inward rotation.

Some cases in the third stage of the disease continue the deformity of the second. These may be, and usually are, cases characterized by great abduction and outward rotation from the commencement of the disease, or soon after. Many of these erratic deformities occur in bed cases from positions of ease assumed while lying. In others the head of the bone is thrust forward against the anterior and upper border of the acetabulum, cutting it away, producing a partial dislocation forward. This extreme abduction puts the adductors on the stretch and partially paralyzes them by tension. The abductors and outward rotators become permanently contractured, adhesions form, and the limb is held in this extreme position of deformity of the second stage in the third.

One of the cases had adduction, outward rotation, and shortening without flexion, because of the destruction of the head and neck of the femur, or the passing of the head through the acetabulum *anteriorly*. This destroyed the leverage of the glutei and flexors, which gave the adductors full power to adduct while the external rotators still acted.

Otto von Büngner⁸⁹⁶ holds that the reason iodoform injections have been less successful in hip-joint disease than in other tubercular affections is on account of faulty technique. In experiments made on the cadaver, he

found that injections after Küster's method deposited the fluid in the joint over the synovial membrane and also over the head of the femur and the acetabulum, while in following Krause's method the substance is not always deposited in the joint and requires certain positions of the joint in order to be successful, which positions cannot always be taken by the diseased joint. The method he employs is to find the point at which the femoral artery crosses the pelvic brim; he then draws a line from this point outward toward the great trochanter. Where this



EXTENSION SHOE FOR SHORTENED LIMBS. (O'CONNOR.)

A, aluminium heel-plate; B, wooden base of "extension"; C, aluminium instep-plate, which keeps pressure of leather off toes; D, foot in position; E, trousers; F, jointed toe of "extension"; G, heel of boot; H, leg.

British Medical Journal.

line crosses the inner border of the sartorius the needle of the syringe is introduced. The needle employed should be from five to seven centimetres long.

The extension shoe of O'Connor, of Cincinnati, Ohio,² for shortened limbs, is a most useful, practical, and sightly appliance. The improvement over the old kind of inclined planes consists in the aluminium plate which passes up behind the heel and so prevents the foot from sliding down the inclined plane after the shoe is laced tight. In the old styles, the constant tendency to slide forward till the toes rested against the front of the shoe often rendered the shoe so painful that patients preferred the less-sightly iron stirrup, but the addition of the firm metal support behind the

heel in the O'Connor shoe holds the foot in position and makes it comfortable. (See illustration.)

Irreducible Ischio-pubic Dislocation.—Tillaux⁸⁵³ reports a case of irreducible ischio-pubic dislocation of the head of the femur of four months' standing. The man fell on his back, and the wheel of a carriage passed over his pelvis. The position, when seen by Tillaux, was flexion sixty degrees, abduction, rotation outward; walking was only possible with two canes, and then only for a few steps. Under an anæsthetic efforts at reduction were futile, and an incision was made behind the thigh, parallel with the tendon of the adductor magnus, beginning at the genito-crural fold, which led directly to the neck of the femur. Efforts to dislodge the head were unsuccessful; so the neck of the femur was cut through and removed, and the neck placed in the acetabulum, which did not require to be gouged out. The patient made a good recovery, and after four months was discharged, walking well without a limp, having no appreciable shortening, rotation normal, flexion to a right angle, abduction and adduction to same extent as the opposite side.

Congenital Dislocation.—Kirmisson, of Paris,⁸⁵³ reports the results in six cases of congenital dislocation of the hip in which he has operated after Hoffa's method, except that he makes a hole in the bottom of the acetabulum, at the junction of the three primitive bones, instead of cutting farther up in the cavity, as he thinks cutting into the upper edge of the acetabulum necessarily shortens the limb. He finds, contrary to Hoffa's statement, that the bottom of the acetabulum is very thin, and that to make a depression deep enough, in his opinion, to retain the head of the femur in position, it is necessary to cut entirely through the acetabulum. He has done this by means of a gouge and a mallet, but thinks it would be better, in cases of hard bones, to use the trephine. He considers the anterior operation of Lorenz inferior, as giving less-ready access to the bottom of the acetabulum, and in not loosening the muscles attached to the great trochanter. He had one fatal result from peritonitis (?) following rupture of the obturator artery in a case in which the pelvis was fractured. The peritoneum was not injured by the operation. There was one bad result; marked septic nephritis and subsequent ankylosis of the joint. One poor result: abscesses formed, and the head of the bone slid upward four

centimetres, the original shortening having been six centimetres. Two of the cases were too recent to be cited, though the head of the bone has, so far, remained in the acetabulum. One case, a child 6 years old, has been operated on fourteen months, and has a shortening of only one centimetre, and the motion in the joint is good. Kirmisson advises drainage-tubes and sewing only the skin, the cases which he sewed up with deep sutures having become septic.

Broca, of Paris,¹¹⁸ reviews the treatment of congenital dislocation of the hip, and concludes that instrumental treatment is useless. He says, speaking of the chloride-of-zinc injections, that the patients shown by Lannelongue had a limp resembling that of ankylosis of the hip instead of the "duck waddle" of congenital dislocation. He thinks, however, that the subperiosteal injection of chloride of zinc above the rim of the acetabulum, practiced after Hoffa's operation for the purpose of deepening the cotyloid cavity, will be of use. He has found the reduction of the deformity by Hoffa's method quite difficult, except in very young children, and remarks that the surgeon must be very thorough in his asepsis in this operation, or he will expose his patient to sepsis, and advises the operation to be confined to those cases where the deformity and disability are very marked. In double cases he would operate on one joint at a time.

Coudray¹¹⁴, reports a case treated by the chloride-of-zinc injections without other operative interference, in which the shortening, originally three and one-half centimetres, had decreased to one and one-half centimetres. The leg had been brought down as far as possible by manipulations before the injections were made, and retained in the improved position by weight and pulley for five months.

Denucé⁸⁵³ reports a case treated by Hoffa's method with two inches shortening, marked lordosis, and a lateral curvature of the spine. A year after the operation the patient still walked well, the lordosis had disappeared, the lateral curvature was much less marked, and the bones had remained in position. There was still one inch shortening, partly to be accounted for by alteration in the size of the femoral neck, and partly by general atrophy of the entire limb, which had been noticed at the time of operation. Bilhaut³²¹ also reports a case treated by Hoffa's method with good results; but the case is too recent to be judged.

Cantru⁸⁵⁸, ~~Nos., m~~ describes the anatomy of an infant who died having a congenital dislocation of the hip. The specimen is to be seen in the museum of the maternity at the St. Louis Hospital, Paris. There was nothing remarkable in the pregnancy. Labor normal, head presenting. The child was the third. The two elder children were well formed. This child had double equino-varus. The glenoid fossæ were both abnormally small, that on the left shoulder especially so, but not sufficient to cause a complete luxation. The heads of both radii were luxated forward. The right hip was normal; the left had practically no acetabulum at all. There was a long ligamentum teres. The head of the femur was markedly atrophied; congenital subluxation was unquestionable. The pelvis was misshapen. The ischium on the side of the luxation was carried too far backward; the ischio-pubic ramus on this side measured fourteen millimetres. The sound side measured eleven millimetres. The whole pelvis was canted forward, the axis of the superior strait making a greater angle with the vertebral column than normal. The symphysis was slightly toward the sound side.

Lejars¹⁶⁴, ~~App. 27~~ operated on a boy 16 years old with dislocation of the hip and six inches shortening, which was said to date from birth and rendered walking almost impossible. There was osteitis of the femoral head. The latter was removed, the end of the bone placed in the new cotyloid cavity, which was hollowed out. The remains of the capsular ligament were united by sutures, and the peritrochanteric tendons were attached to the periosteum of the great trochanter, extension being applied and continued for a month and a half. Three months after the operation the patient was able to walk well, and now, sixteen months later, he can go about on his feet for five hours at a time with only the aid of a cane.

Hoffa³⁴, ~~Nos., 2~~, reported before the Twenty-second Congress of German Surgeons the results of the twenty-six cases on which he had operated for congenital dislocation, having had no deaths since the first reported. He showed a case of bilateral dislocation which had good use of the joints, ran and played like other children, and had no lordosis. Two cases—unilateral—had a very slight limp owing to shortening of the leg from defective growth. These cases, he said, were fair samples of the usual result of the opera-

tion. He still thinks the operation especially adapted to young children, but mentions the fact that cases older than he had formerly thought practicable had been operated on with success.

He differs from Kirmisson as regards the thickness of the pelvis at the point where the acetabulum is to be formed, probably, as the latter says, because they have selected different points in making the acetabulum. Hoffa lays great stress on making the edge of the new acetabulum sharp and deep; otherwise the bone will not remain in place. In hollowing the acetabulum he uses a sharp scoop with a bayonette-shaped handle. In all his cases he found the remains of an old acetabulum, and in investigating pathological specimens found it in one hundred and four out of one hundred and eleven instances, the exceptions being adults who might have shown evidences of the acetabulum earlier in life.

He calls attention to the importance of cutting the hamstrings and adductors in those cases where they prevent reduction of deformity,—which he mentioned in his first paper, although many writers appear to think that this suggestion comes from Lorenz,—and in the case of adults recommends that trial of manipulation and traction under anaesthesia precede operative interference. In the cases in which the neck of the femur is twisted forward he recommends that the leg be strongly rotated inward, so as to bring the head of the bone into the acetabulum, retaining it there for some months before efforts are made to place the foot parallel with its fellow, as otherwise the head of the bone will be twisted out of the acetabulum.

For after-treatment Hoffa³⁴,_{Sept. 12} uses a corset, which is a combination of his scoliosis-corset and Hessing's pelvis-belt. It is open front and back, and re-inforced in the back by long steel strips on each side of the spine; from the lower part of these run steel bands, passing over the iliac crests to the front. Joining the front and back extremities of these iliac bands another well-padded steel band runs around the outside of each side of the pelvis at the level of the trochanter major. Here it presses, when tightly fastened, around the body by means of the firm leather strips that unite the two sides in the front and rear.

Lorenz,⁵⁷,_{July}, has operated on thirty-one cases of congenital dislocation of the hip, and reports three which, however, have not been walking long enough to render a definite opinion as to the ultimate

result possible. In one case the bones could not be kept in place except by strongly abducting the thigh, in which position the bones were ankylosed, and Lorenz proposed to do a subtrochanteric osteotomy of the femur to place the legs parallel.

LEG.

Angular Deformities of the Knee.—Joel E. Goldthwaite, of Boston,²⁹ describes a very admirable machine for this purpose, which is a modification of Bradford's, and is designed to correct the posterior subluxation of the head of the tibia on the femur at the same time that the shin is brought into a straight line with the thigh.

The operation, which is always performed with the patient anaesthetized, may be briefly described as follows: First, the adhesions are broken up as much as possible with the hands only (this in some cases means a good deal and in others practically nothing), and after this the apparatus is applied, with the leg flexed. The posterior band, *D*, is then screwed forward; and, after as much force has been applied as seems prudent, the leg is straightened as much as possible by means of the long lever-handle, the power being applied intermittently. The apparatus is then taken off, and the leg again manipulated with the hands to still further break up the adhesions; after which, with the apparatus, the complete correction is attempted. In a mild case one application may be all that is required, while in others several applications (at one sitting) may be necessary before the position is entirely satisfactory. At times, when the apparatus is finally removed, the head of the tibia drops back and cannot be held in place, even though the leg be straight, because of the firm contraction of the hamstring tendons. This may be overcome by division of the tendons, or, what is better, as was done in one of the cases operated on, the leg should be put

FIG. 1.—DEFORMITIES OF THE KNEE. (GOLDTHWAITE.)
Boston Medical and Surgical Journal.

up slightly flexed, enough to relax the contracted parts, and the dressings allowed to go undisturbed for one week. "At the end of that time the tendons had relaxed so much that the leg could easily be straightened and the correct apposition of the bones maintained." During the operation the rotation of the leg, which is due to one condyle of the tibia slipping farther back than the other, can be corrected very easily by simply rotating the apparatus so as to bring the greatest pressure upon the condyle that is posterior. If this last deformity be allowed to remain, it not only produces an awkward gait, from the turning out of the foot, but also, from the posterior position of the outer condyle of the tibia, a more or less marked knock-knee is produced. However, the knock-knee is due to an elongation of one condyle, as a result of

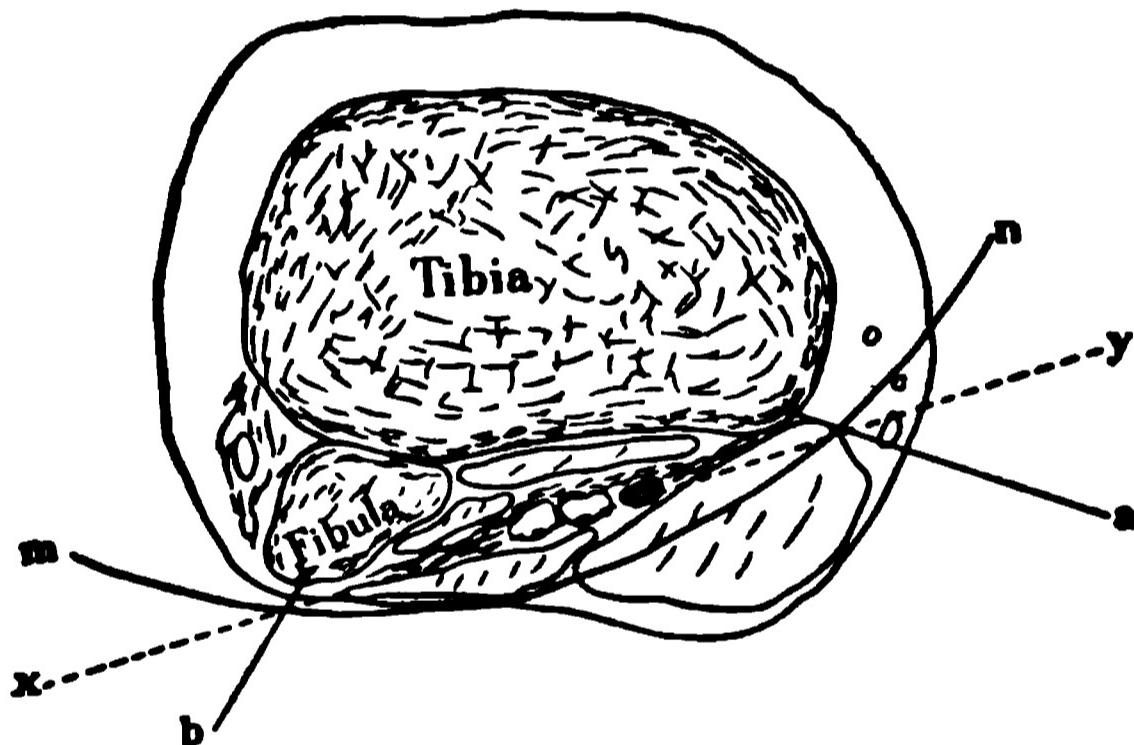


FIG 2.—DEFORMITIES OF THE KNEE. (GOLDTHWAITE.)
Boston Medical and Surgical Journal.

the disease, and a Macewen osteotomy may be necessary; but it is best to wait a few weeks, at least, as in one of the cases in which this deformity was well-marked it entirely disappeared without operation, evidently being due to an old inflammatory deposit on the inner side, which was absorbed.

The after-treatment is simple. A plaster-of-Paris splint is applied, and allowed to remain undisturbed for a week or two, till pain and heat have subsided. The patient is then put on a Thomas knee-splint and allowed to go about, the splint being worn for a variable length of time.

In calling attention to this treatment it is to be understood that the original cause of the deformity is of little consequence, and that whether it be rheumatic, gonorrhœal, or tubercular, or

whether the disease has been confined to the joint or to the structures about the joint, the deformity can be corrected as thoroughly, and without much more danger, in one case as in the other. In the tubercular cases a considerable interval, at least two years, should be allowed after the disappearance of all of the acute symptoms, before the correction be attempted, because of the danger of starting up the tubercular process. In the gonorrhœal or rheumatic cases the apparatus can be applied at any time where it is reasonable to suppose, from the duration of the disease, that adhesions have formed. Usually, in these cases, the pain will cease with the restoration of motion.

The dangers attending the use of the apparatus are very slight if its principles are understood and ordinary precautions are used. In the acute cases, and in those in which there is bony ankylosis, its use is contra-indicated. The danger of lacerating the vessels and nerves in the popliteal space, from the application of so much force, is very slight. The head of the fibula and the inner condyle of the tibia act as buttresses, and upon these points the pressure is applied while the vessels lie deep in the muscles entirely protected, as is shown in Fig. 2. In cases of extensive periarticular disease behind the joint, it would be better to straighten the leg gradually, gaining a little with each operation, rather than to correct it at one sitting; in which case the vessels might be lacerated, from being involved in the old cicatrix. The cases reported in connection with this paper present results that are brilliant in the extreme.

A case of right-angled deformity at the knee, with fixation of the patella, as a result of tubercular arthritis, is reported, in which, after the patella could not be dislodged by blows with a mallet from the outside, H. A. Wilson, of Philadelphia,⁸⁰ loosened the patella through a lateral incision by means of an osteotome, and, having cut the constricting bands between the tibia and femur, put the leg in a straight line with the thigh. He then kept it in position by a plaster-of-Paris splint placed over the antiseptic dressings. No reaction followed, and in three months the patient could walk without pain.

John Ewens, of Bristol,²⁶ presented a paper on overgrowth of the inner tuberosity of the tibia as a cause of genu valgum, independent of elongated inner condyle of the femur. He advocated

removal of a wedge of bone from the tibia in preference to linear osteotomy.

Grattan, of Cork,²² describes the latest form of his osteoclast, which he has improved in many ways. He states that he has replaced the racket attached to the former patterns of the instrument by a small thumb-screw; by this means he has been able to regulate the distance of the opposing bars with great nicety. He has also been able to prevent the central pressure-bar from rotating by

OSTEOCLAST. (GRATTAN.)
Medical Press and Circular.

means of a strong guide-bar attached to it, which works parallel to the screw through the pivot which connects the bars together. The screw he now uses is much more powerful than before; it is one inch in diameter and contains five square threads to the inch. The levers attached to this screw are eighteen inches long. He states that he believes this instrument, as now arranged, to be a perfect one of its kind, and that he has been able to eliminate the defects of the former ones. He has used his instrument post-mortem on a full-grown, vigorous man, breaking the femora with the greatest

celerity and ease; the bones were examined with the resulting proof of their having been broken by a clean transverse fracture at point of selection, without injury to the periosteum.

Lorenz, of Vienna,²³⁸ describes his "*redresseur osteoclast*," by means of which he changes the direction of deformities at the knee, and also corrects club-feet. Taking advantage of the elasticity of the ligaments, he "models" the parts, and hence gives the name "modelling redressement" to the operation. His apparatus

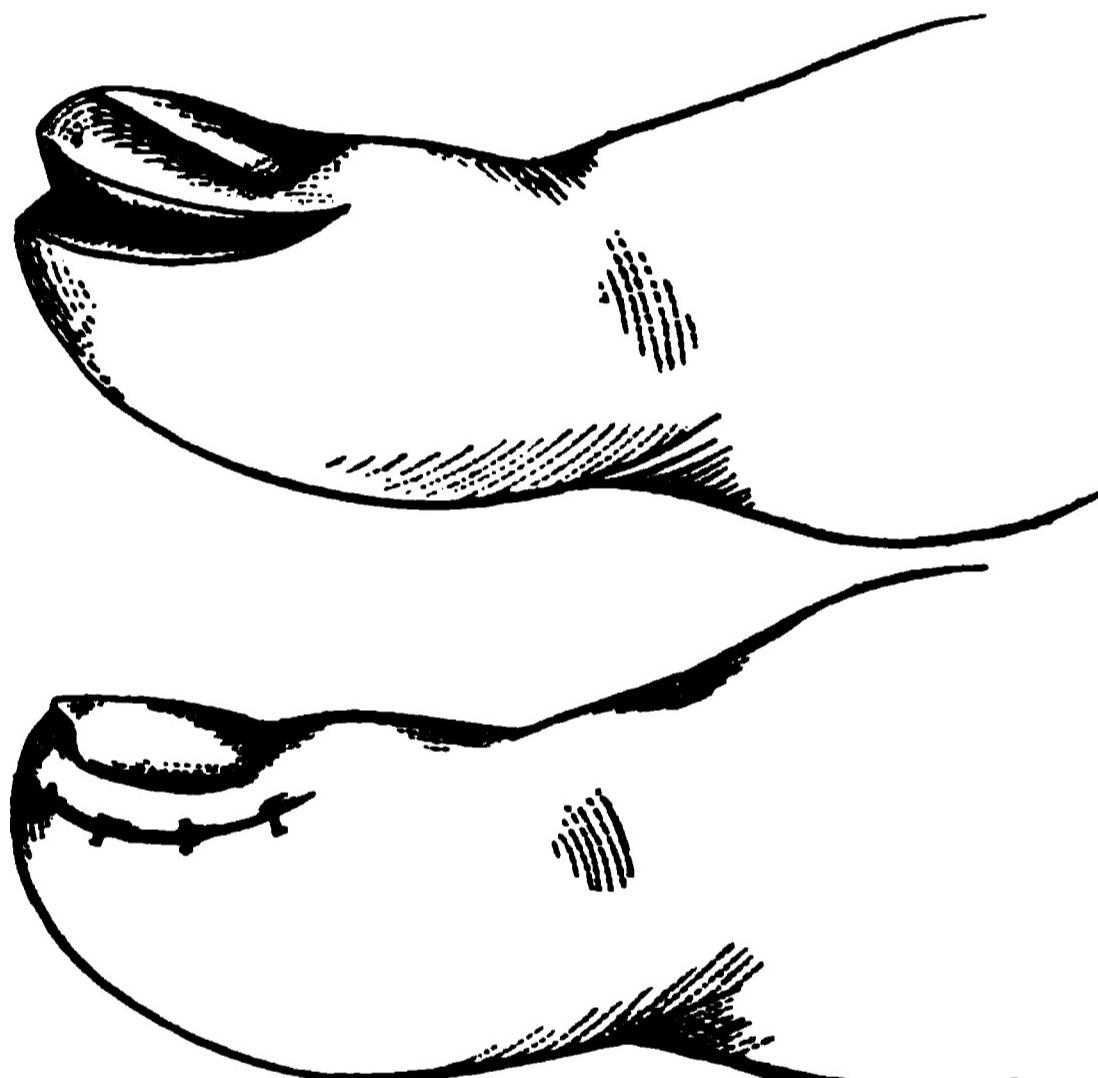
NEW OSTEOCLAST. (DELORE.)
Revue d'Orthopédie.

consists of two concave metal plates, covered with a thick layer of India rubber, one of which is fastened to a firm wooden support. The other is pressed against it by means of two screws. The knee or foot, as the case may be, having been placed between the two, the "modelling redressement" is carried on slowly and gradually, but still as a continuous act, at one sitting. Only a slight amount of force should be employed at first, the pressure gradually increased as the parts yield. The patient is thus confined to bed but a few days after the operation, as no serious

injury to the parts has been done. It is to be regretted that no illustration of the osteoclast is given to make the written description more intelligible.

FOOT.

Club-Foot.—Delore⁵⁵³ has a series of articles on inveterate club-foot, in which he advocates forcible replacement of the deformity after tenotomy in preference to open incision or resection of bone. He describes a new form of osteoclast for the purpose of correcting the deformity, the working of which can be easily seen from the cut on preceding page. Its principles are much like



OPERATION FOR INGROWING TOE-NAIL. (HOWARD.)
New York Medical Journal.

those of Bradford and Morton's instrument, but would, on casual inspection, not seem to be so easily adapted to the varying deformities of the foot as that of Phelps, though the force exerted by it is practically in the same direction.

McCormick read a paper before the Intercolonial Medical Congress, in Australia,⁵⁵⁷ on an improvement on Fitzgerald's procedure for treating talipes, by which he avoids opening the joints of the tarsus. He first divides the bony parts in a line a little behind the line of incision in Chopart's operation, and then in a line through the cuboid and three cuneiform bones. The skeleton of the foot is then in three distinct pieces, and can be molded

into whatever shape is required. McCormick, of course, only resorts to this operation after free division of the soft parts has failed to reduce the deformity. With these exceptions the literature of club-foot for the past year contains nothing new.

Ingrowing Toe-nail.—W. R. Howard, of Fort Worth, Texas, ¹, describes his mode of operating on ingrowing toe-nails, which, he claims, is very successful. He cuts a slice from the toe below the nail and parallel with it down to the bone, the piece being wedge-shaped with the apex toward the bone and the base in the skin. The cut is then sewed up, which causes the flesh to be pulled away from the nail. (See cut on opposite page.)

C. N. Dowd, of New York, ², reports twenty-three cases of

FIG. 1.

FIG. 2.

OPERATION FOR INGROWING TOE-NAIL. (DOWD.)

Fig. 1, Lines of incision; Fig. 2, flap and stitches in position.

Medical Record.

ingrowing toe-nail on which he operated by Anger's method. Cocaine anaesthesia was used; a rubber tube around the toe made the operation bloodless.

The essential feature in the radical cure is the removal of that portion of the matrix from which the troublesome part of the nail grows. The matrix of the nail should be distinguished from the bed of the nail. When this is removed the growth of the nail ceases. The cures seem to be permanent, and healing is much more rapid than by the operations ordinarily done. The operation consists of the removal of the side of the ingrowing nail, the inflamed tissue about it, and a portion of the matrix, leaving a lateral flap which is applied over the raw surface. The lines of the

incision are shown in Fig. 1, *A, B, C, D*. Horsehair stitches were applied in the manner shown in Fig. 2. (See preceding page.)

J. A. Batton, of Uniontown, Pa.,¹¹⁹ finds that he can relieve his cases by dusting the granulations at the bottom of the sulcus with aristol or iodoform and putting a little cotton on top. He then bandages the toe with rubber bandage one-half inch wide and twelve inches long, carrying it toward the inflamed part so as to draw the latter away from the nail; the patient can then wear his shoes and walk about. The patient can re-adjust the bandage himself every day, and in the course of a few days the swelling is relieved.

E. A. Benton, of Central City, Neb.,¹⁰⁸ says he has abandoned the cutting operations. He disinfects the part, removes all crusts, raises the detached or undermined portion of the nail as much as possible; he then crowds the hypertrophied integument back from the nail and drops 3 or 4 minims (0.2 to 0.26 gramme) of solution of subsulphate of iron into the space thus obtained, and with a pointed probe works the iron to the very bottom of the diseased spot. The toe is then wrapped in absorbent cotton, all pressure being avoided by wearing a large shoe or slipper. Three applications three days apart, if thoroughly done, are sufficient for a cure. The pain and soreness decreases from the first and no detention from business is required.

Metatarsalgia.—Thos. S. K. Morton, Philadelphia,¹¹⁹ contributed a long and interesting article on this subject. The disease is described as a painful affection of the plantar digital nerves, directly caused by pressure upon or pinching of them by certain portions of the metatarso-phalangeal articulations, especially the fourth. The pain caused is often so excessive that sufferers are obliged to remove their shoes irrespective of surroundings, and in the most severe cases become bedridden and neurasthenic.

The less-severe forms of metatarsalgia may often be prevented from running into the more-serious types by proper shoe construction or by wearing a narrow flannel bandage about the ball of the foot. Morton directs that the bandage be two inches wide, and long enough to wrap neatly and firmly about the metatarsus some five or six times. The end is pinned and the stocking drawn over. This has given marked relief in a number of cases. Pro-

longed rest in bed will benefit all cases more or less, and occasionally secure relief for long periods, or even permanently cure the milder phases of the disorder.

Operative treatment should be limited to the metatarso-phalangeal articulation from which the neuralgia radiates, or, perhaps, to amputation of the corresponding toe above the joint. A vertical incision from one and a half to two inches long is made, beginning over the proximal interphalangeal joint and extending upward in the centre line of the toe. The extensor tendon now comes into view and is divided. Another stroke of the knife carries the incision through its entire length down to the bone. The handle of the knife or other moderately blunt implement is then employed to separate the tissues from the upper and lateral portions of the joint. Next the blades of a powerful, sharp-pointed, narrow-bladed, cutting pliers are pushed down on either side of the phalanx immediately below its base (hollow of the blades always toward the articulation), and this bone divided. The metatarsal bone is then similarly divided just above its head. The separated joint is then seized by bone-forceps and dissected away from any remaining attachments. This done, the flexor tendons will be seen lying at the bottom of the wound, and should be picked up by forceps and divided with scissors. If haemorrhage is severe and not controllable by moderate compression of the parts, ligatures should be applied. The wounded edges are next to be approximated—no drainage being required if asepsis has been maintained—by continuous or interrupted suture, as may be preferred. A gauze-and-cotton dressing is finally applied and bound firmly on with a wet-gauze roller, care being taken to place little pads of gauze in such positions as will hold the toe in its proper position during healing. The foot should be kept considerably elevated for the first two days, after which it may be brought to the level of the bed.

RICKETS.

Korsakow,²¹ ~~10, 11~~ in a monograph on experimental rickets and its pathogenesis, details a number of experiments on animals. He fed dogs on a diet poor in lime, and in another series of dogs he administered, in addition to this diet, strontium salts. In both, the same apparent changes took place during life,—loss of motion,

curving of bones and thickening of their ends,—but at the autopsy the bones of the animals which had been fed on strontium were much firmer than those of their comrades, the diaphyses being almost as firm as normally. The part of the diaphysis which is generally spongy was firm, and white, with a rosy tint; the epiphyses were also firm. In the animals which had had no strontium the diaphyses were porous.

Levrat,³²¹ ~~1888~~ speaks of the development of rickets during adolescence, and divides it into three classes: scoliosis, false coxalgia, and exaggerated forms of knock-knee. Ten children, from 11 to 15 years of age, were seen by him, having lateral curvature of varying degrees, accompanied in each instance by a goitre, which, according to the parents' statements, had developed *pari passu* with the lateral curvature. In four cases there were enlarged wrist-joints, like those seen in rickety infants, and two cases had knock-knee.

He had also seen five cases of children brought to him for hip disease in which he made a diagnosis of rickets, and where rest in bed for a month, together with antirachitic treatment, caused the permanent disappearance of all symptoms of coxalgia; the children walking without limping, pain, or fatigue. They all developed, while under observation, nodes on wrist, ribs, and insteps, and presented, as did the scoliotic cases, marked goitres.

Vierordt, ⁴_{May 16}, ²_{May 27} at the Wiesbaden Congress, gave the results of a study of the absorption of lime-salts in children. He found it possible, by feeding rickety and healthy children on a similar diet of milk and pap, to render the quantity of lime excreted in the urine constant. He then added to the diet inorganic lime, and found that the amount of lime was increased to the same degree in the urine of the healthy and of the rickety children. He concluded that absorption of lime is not decreased in rickets, and that all theories founded on the assumption of diminished absorption of lime must be rejected. He pointed out that Baginsky also had found that the amount of lime excreted by rickety and by healthy children was the same.

AMPUTATIONS, RESECTIONS, AND PLASTIC SURGERY; DISEASES OF BONES AND JOINTS.

**By P. S. CONNER, M.D.,
AND
LEONARD FREEMAN, M.D.
CINCINNATI.**

AMPUTATIONS.

Senn, of Chicago, ¹⁰⁸⁰_{v.1,p.243} offers an improved "bloodless" method of amputating at the hip-joint. The essential features are: 1. The bone is disarticulated and stripped, as far as necessary, of its soft parts through a long, external Langenbeck incision, before the vessels are secured, and without a preliminary high amputation, as in other methods. 2. A pair of forceps is forced from within the wound through the inner tissues of the thigh and made to grasp by its centre a piece of elastic tubing, three-fourths inch in diameter and about four feet in length, which is drawn through the thigh and out at the external wound. 3. After dividing the tubing, the upper half is tied tightly about the soft parts above, while the lower half is crossed beneath the inferior soft parts and its ends brought around the limb and also fastened above. 4. A long anterior and short posterior flap should be preferred, and the muscles divided so as to form somewhat of a hollow cone with its apex upward. Senn claims that owing to the external incision being made before elastic constriction is resorted to, haemorrhage is reduced to a minimum. As the operator can use the entire leg as a lever, disarticulation is facilitated. The method is so certain in its control of haemorrhage, and so easy to carry out, according to the author, that skilled assistants may be dispensed with in case of emergency.

J. B. Murdoch, of Pittsburgh, ⁹⁸_{v.1,p.243} considers that an ideal amputation at the hip-joint would be a combination of the Furneaux-Jordan method with Wyeth's device for controlling haemorrhage. He is a firm advocate of torsion, which has been resorted to one

hundred and forty-six times in amputations of the thigh, at the Western Pennsylvania Hospital, without a case of secondary haemorrhage.

Meacham²⁰⁸ gives an interesting synopsis of various operations performed by Samuel H. Pinkerton, of Salt Lake, among them one hundred and four major amputations, with ten deaths. Gregory Doyle¹⁷⁰ made a successful double synchronous amputation of both legs in an infant of 2 years.

It has recently been recommended, by Heidenhain and others, to amputate at or above the knee in all cases of senile or diabetic gangrene, as soon as the disease has reached the sole or dorsum of the foot. König,⁸⁴⁴ on the contrary, speaks against this, and advises elevation of the foot, so as to favor circulation, together with careful disinfection, until a line of demarkation has formed. An amputation should then be made two or three finger-breadths above the gangrenous portion. If this fail to check the disease, it is then time to make a high amputation. Thirteen patients—8 diabetics and 5 with arterio-sclerosis—were treated in this manner. Four high and 10 low amputations were made, of which the former all died, while 9 of the latter recovered. Of the 9 cases which lived, 7 had primary union, 1 delayed union, and only 1 required a secondary high amputation. In all, the stumps remained permanently healed.

In a case of extreme collapse, with great loss of blood, due to a railroad crush of both lower extremities, von Bardeleben^{4, 6, 217, 218} opened both median basilic veins and injected nearly 3 pints ($1\frac{1}{2}$ litres) of 0.6-per-cent. salt-solution. Both limbs were then successfully amputated, one below the knee and the other below the trochanter.

Poncet²¹¹ describes several tibio-tarsal amputations in which a single dorsal flap was employed, according to the method of Baudens, first published in 1839, and since almost forgotten. The operation is most applicable to cases in which the tissues of the heel are damaged, and gives good results.

A case of gangrene of the finger in a child, from the employment of a carbolic-acid dressing, is mentioned by Jayle.⁷ Amputation was resorted to. Sheppard²⁸² and Poncet²¹¹ each report a successful interscapulo-thoracic amputation.

Contrary to the repeated assertions of Truax, noticed in pre-

vious numbers of the ANNUAL, George E. Marks asserts⁶¹ "that modern leg-makers care nothing for the 'point of election,' as artificial legs can be made that may be worn on stumps of any length. A stump that is capable of bearing weight on its extremity is preferable to one that is not. Syme's operation gives an end-bearing stump of the most favorable kind; and the methods of Pirogoff, Chopart, Lisfranc, Hancock, and Hays are all capable of excellent prosthetic treatment; but in every partial foot amputation care should be taken to prevent contraction of the tendo Achillis. A stump extending below the knee is preferable to one extending to the knee, provided the stump is capable of flexion and extension. If the stump is disposed to become extended and ankylosed, it will be preferable to sacrifice the leg to the knee. A stump extending to the knee is preferable to a shorter one. The condyles and nodules of the femur should never be excised in knee disarticulations. If the patella can be placed in the intercondylic space and properly secured, it is always desirable to do so." Stephen Smith, of New York,⁹ discusses some facts bearing on the condition and serviceableness of stumps after amputations in the lower extremities at different points and by various methods. He concludes that "the stumps left after ankle-joint amputations are far more serviceable than those resulting from leg amputations for unassisted locomotion," and that "an artificial limb can be far more usefully applied to an ankle-joint than to a leg-stump."

Pitschke³³⁶ calls attention to necrosis of fatty tissue after surgical operations, and reports a case in which lumps of fat were extruded through fistulæ in the axilla for several months. He suggests that a similar process may account for certain cases of protracted healing of wounds in parts well supplied with adipose tissue.

RESECTIONS.

Knee.—Ollier, of Lyons,²¹¹ reports the statistics of 100 resections of the knee-joint for tuberculosis. The advent of anti-sepsis and asepsis has made a great change in the mortality. Up to 1863 there were 7 cases, of which 85 per cent. died. From 1863 to 1884, the operation having been practically abandoned until 1877, the mortality was reduced to 33 per cent., still remaining too high, on account of late interference, when the patients were exhausted by disease. Since 1884 the percentage of deaths

has been reduced to 7.8; and since 1889, in 38 operations, the mortality has been zero. He strongly recommends early operation, and emphasizes the inefficiency of treatment by apparatus. Ollier speaks in favor of typical resections, as they disclose hidden foci; and discountenances those which are partial, except in the young, where it is necessary to carefully avoid the epiphyseal lines of growth. Shortening of the limb is unimportant when it does not exceed five or six centimetres; even a shortening of ten to twelve centimetres may be sufficiently overcome by inclination of the pelvis and an elevated shoe.

J. E. Moore, of Minneapolis,¹ records six resections of the knee-joint. He uses the Esmarch bandage, but removes it before applying the dressings, in order to control haemorrhage. His incision passes above the patella, which bone is always removed. The bones were united by four steel-wire nails, which remained in place a month, before which time the first dressings were not



FLUSHING GOUGE, WITH RUBBER TUBING, TO CARRY HOT WATER TO THE CUTTING EDGE. (BARKER.)
The Clinical Journal.

removed. Rubber drainage-tubes are not desirable, as relapses are apt to occur around the openings left by them. The results were all good.

Arthur E. Barker¹⁰⁷⁷ discusses 25 consecutive cases of resection and arthrectomy of the knee. He emphasizes the necessity of recognizing that resections may now, under aseptic and antiseptic precautions, be made upon much older individuals than was formerly considered justifiable. He uses the "flushing gouge" (see illustration) instead of a saw, having found it necessary to employ the latter in but four cases. The stream of water passing through the handle of the instrument removes all *débris* and keeps the field clean. Drainage was not employed.

Ankle and Foot.—Arbuthnot Lane² describes a new method for completely exposing the interior of the ankle-joint: "A more or less horizontal incision is made from the anterior margin of the internal malleolus outward across the front of the ankle-joint, backward immediately below the external malleolus, and inward

above the heel, to a point over the tendon of the flexor longus hallucis, everything being divided down to the bone. On adducting the foot, any portion of the interior of the ankle-joint is fully exposed."

An interesting article on the Vladimirow-Mikulicz osteoplastic resection of the tarsus has been written by Roesch.²⁹³ _{Feb.} Seventy-six cases have been reported, with 57 good or very satisfactory results. One case died of pyæmia. Fourteen secondary amputations were necessary,—10 for returning caries, 3 for gangrene of the anterior portion of the foot, and 1 for failure of osseous union. The different methods of operating, indications, precautions, etc., are discussed.

Reverdin, of Geneva,¹⁹⁷ _{Aug. 30} writes on posterior tarsectomies. He advocates the removal of the astragalus by an external incision, with division of the peroneal tendons.

Shoulder.—A successful synchronous resection of the heads of both humeri, for acute osteomyelitis in a child of 2 years, was made by Owen and Wagstaff.⁶ _{Mar. 4} John B. Hamilton, of Chicago,¹⁹ _{Jan. 28} reports a satisfactory resection of the shoulder-joint for tuberculosis, according to the new method proposed by Senn, i.e., temporary resection of the acromion, so as to retain the attachment of the deltoid.

Scapula.—Sloughing of the flaps from lack of nutrition, according to A. M. Phelps,¹⁹ _{Sept. 11} being apt to occur after resection of the scapula with Langenbeck's incision, the formation of a horse-shoe-flap is suggested. (See cut on following page.) Phelps reports a successful resection of the scapula with retention of the arm. One hundred and eighteen of such cases have been reported, 58 of which were for tumors, 9 for caries and injury, and 58 for unknown causes. There were 25 deaths, 3 cases not being reported upon, giving a mortality of 22 per cent. The following are the author's conclusions: "1. Total extirpation of the scapula is not an extremely dangerous operation to perform, if care is taken to cut in such an order as to secure the supra-scapular, posterior scapular, and infra-scapular arteries. 2. In cases of malignant disease attended by extreme vascularity, I would suggest that the subclavian artery between the coracoid process and the thyroid axis be compressed by means of a large, curved needle, transfixing all the tissues, carrying underneath

everything a silk ligature, which should be tied temporarily, thus controlling the haemorrhage. It will be remembered that the scapula receives its vascular supply superiorly from the thyroid axis, which is given off from the subclavian. 3. That Langenbeck's incision should not be used, for the reasons already given. The curved incision which I suggest (see cut, B) is based upon the vascular anatomy of the parts."

HORSESHOE-FLAP TO PREVENT SLOUGHING. (PHELPS.)
A, Langenbeck's Incision, showing slough ; B, as it should be from an anatomical stand-point.
Medical and Surgical Reporter.

Ilium.—Nélaton¹⁵¹ has successfully removed the entire ilium. The patient was afterward capable of walking short distances with the aid of a cane and a high shoe.

DISEASES OF BONES.

Tuberculosis.—The attempt to cure tubercular joint-lesions by means of deep injections of various substances has met with considerable success, and seems to be steadily growing in favor. Chloride of zinc, according to the method of Lannelongue, has been extensively used in France, while the Germans prefer iodoform. Neither of the methods have yet become very popular in the United States.

Sahli, of Langenthal,²¹⁴ writes on the use of iodoform injections in tubercular disease of bones and joints. The best preparation is that employed by Garré, of Tübingen, in which sterilized

olive-oil is thoroughly impregnated, by prolonged shaking, with 10 per cent. of iodoform; 4 per cent. dissolves and 6 per cent. remains in suspension. An ordinary hypodermatic syringe may be used. It is well to partially withdraw the needle and re-insert it, so as to deposit the iodoform in several different foci. There is little doubt that the effectiveness of the treatment lies in the liberation of small quantities of free iodine by the gradual action of the fluids of the body. Sahli, contrary to the advice of Bohny, often injects as much as 2 grammes (31 grains) of iodoform-oil at a time, and has never produced symptoms of intoxication. Pain or inflammation very seldom results, and cold compresses, etc., are unnecessary. During four or five weeks the injections should be made twice a week; and then, for the same length of time, once every one or two weeks. The patient should then be carefully watched for some time. In severe cases the treatment must be continued much longer, and the individual should not be lost sight of for at least six to twelve months. Improvement should begin after four or five injections, but care should be taken not to stop the treatment too soon.

An excellent *r  sum  * of the *technique* involved in the injection into tubercular joints of emulsions of iodoform in olive-oil is given by W. L. de Vos.²⁰⁶⁷ The method of preparing the emulsion and the most advantageous points for injecting each joint are indicated.

Broca⁶,₁₅ has written a monograph on the treatment of tubercular osteo-arthritis in children, in which the different operative measures are fully discussed, and Lannelongue's treatment by injections of chloride of zinc carefully described.

J. D. Griffith, of Kansas City,⁷² speaks very highly of Max Sch  ller's guaiacol treatment of tuberculosis. During the past two years he has used it "in forty-one cases of tubercular joint trouble, and in no case (uncomplicated with cavities in the lungs), where the drug has been continued for six weeks, has he yet failed to see an increase in weight in the patient and a diminution in joint symptoms." In thirteen cases of Pott's disease and in two cases of sacro-iliac disease with sinuses the results were good. It also acted well when injected into tubercular joints. "After the apparent cure of a local tubercular lesion, treated surgically, he uses guaiacol for from five to eight months." The author gives pure guaiacol four to five times a day, in doses of from 2 to 5 drops,

on a lump of sugar, in sweetened water, in milk, or in beer. Its use should be continued for from eight weeks to a year and a half. Voute,¹¹⁸ after numerous experiments, concludes that injections of aristol are of no special value in the treatment of tubercular lesions.

"Luton^{113, 112} has employed subcutaneous injections of phosphate of copper, with very good results, in white swelling. He uses the following solutions: Crystalline phosphate of soda, grammes 5 ($1\frac{1}{2}$ drachms); distilled water, glycerin, $\ddot{\text{a}}\ddot{\text{a}}$ grammes 30 (1 ounce); also acetate of copper, gramme 1 ($15\frac{1}{2}$ grains); glycerin, distilled water, $\ddot{\text{a}}\ddot{\text{a}}$ grammes 20 (5 drachms). These two solutions are mixed without filtering. A turquoise-blue solution results. As the preparation has a tendency to precipitate the copper phosphate, it is to be well shaken before use. Usually an hypodermatic syringeful is injected deeply into the thigh behind the great trochanter, the puncture being covered with collodion. The injections are generally not very painful, although in some cases pain sets in after an interval of two or three days. The injections are made at intervals of fourteen days. The immediate consequence of this treatment resembles that of tuberculin. The temperature rises on the evening of the day of injection or the next day, and continues over two or three days. Locally there is congestion of the affected spot; the tuberculous glands swell; the diseased joint becomes painful. After the disappearance of the reaction fever the patient gradually improves, the articular pains disappear, and after a few days the mobility of the joint increases and finally becomes complete, if the lesion be not too far advanced. If the pains last longer than fourteen days, a second injection is to be made, and so on. As soon as the pains have completely disappeared the patient may leave the bed. This method has the advantage of not compelling the patient to be immobilized. Whether the disease will recur is still a question, as the method has only been tried in a few cases."

Following out the idea that passive congestion of the lungs seems to produce immunity from tubercular infection, Bier, of Esimarch's clinic, in Kiel,¹¹⁴ proposes to treat joint tuberculosis upon the same principle. The limb below the joint is carefully bandaged; above the joint an elastic band is applied, of sufficient tightness to impede the circulation without arresting it, thus

producing congestion and some swelling in the diseased region. Twenty cases have been treated with favorable results. W. H. Brown,⁶ however, tried this method of treatment in nine cases of early joint tuberculosis, with unsatisfactory results. Sufficient data have not yet been accumulated to judge of its real worth.

Félixet⁹¹,_{Nov., 1878} advises the employment of extreme heat, by means of a blow-pipe flame passed rapidly over the tissues, in the sterilization of wounds, especially if tubercular. The tissues are dehydrated, but not cauterized, unless the process is unduly prolonged. There is generally no pain, no reaction, and no loss of blood, and union by first intention may be expected.

An extensive illustrated article by Alexander, of Liverpool,¹⁸⁷ treats of tuberculosis of joints. The author emphasizes the obscurity still surrounding the origin of these affections, and places little weight on heredity. He regards injury as a cause, followed by use of the part in such a manner as to keep up an irritation. When the focus begins near the insertion of a ligament or tendon, as he thinks it generally does, the movement and consequent irritation are all the greater. Small injuries do the most damage in this direction, as more severe ones necessitate a prolonged and absolute rest of the part. In speaking of treatment, which is very thoroughly considered, the author remarks: "Whilst a considerable amount of rubbish has been written about the importance of extension in joint disease, it remains a fact that some children are most relieved from pain and startings of the hip-joint by the old-fashioned weight and pulley." As regards fixation splints, he says that "neither the profession nor the public have acquired a due sense of the importance of the splint being properly applied for a sufficiently long time." As the most important of all local proceedings he regards thoroughly "lining" the skin over the affected joint once a month with the thermo-cautery; the swelling often rapidly disappears, and a cure is at times secured. Abscess-cavities should be opened *freely* and drained thoroughly; small openings are dangerous.

Riedel, of Jena,³³⁸ _{Feb. 18} has written on the frequency of sequestra in tuberculosis of the large joints, and makes some observations on the treatment of joint tuberculosis. Tubercular foci in bones, when no sequestra are present, often heal spontaneously; but the presence of a sequestrum renders healing impossible, unless this be

removed; hence statistics throwing light on the frequency of sequestra are of importance. Riedel reports 314 cases of tuberculosis of the six large joints, in which the disease began in the capsule in 32 per cent. and in the bones in 68 per cent.; in 67 per cent. of the latter sequestra were present, and in 33 per cent. were absent. Hence, out of 314 cases 45.55 per cent. were devoid of sequestra. If to the above 34 cases of tubercular foci near the large joints are added, the total number is raised to 348, of which 48 per cent. had sequestra. As regards individual joints, in 88 cases of coxitis 70 per cent. had sequestra; in 116 cases of tuberculosis of the knee-joint, 37 per cent.; in 39 cases of tuberculosis of the ankle, 38 per cent.; in 10 cases in which the shoulder-joint was affected, 50 per cent.; in 48 cases of disease of the elbow, 31 per cent.; in 13 cases of disease of the wrist, 15 per cent.

According to the foregoing figures, the elbow has the best chance of recovery without operative treatment, followed by the knee and then the ankle. The hip-joint, which is most often treated by conservative methods, offers the least chance of success; so that very few cases are permanently cured by injections, etc. In spite of these statistics, however, the operative treatment of the other joints gives such good results that Riedel would advise its continuance.

In the following statistics from Aachen only those cases are designated as cured which were discharged without fistulæ. The total number was 137. Of these 75 per cent. were cured; in 13 per cent. fistulæ remained; subsequent amputations were made in $3\frac{1}{2}$ per cent.; $8\frac{1}{2}$ per cent. died. In 49 resections of the hip-joint there resulted 62 per cent. of cures. Owing to the resulting shortening, the author would be glad to discard resection of the hip; but, seeing that injections of iodoform are particularly useless in this joint, there remains nothing else. He has succeeded, however, in several cases, in removing the capsule and leaving the head of the bone in place. This is best done by means of a transverse incision. After 40 years of age, and even earlier, exarticulation is recommended. In 51 cases of resection of the knee with extirpation of the capsule, 88 per cent. of cures resulted. As with the hip-joint, Riedel regards the fortieth year as the limit of time in which resections should be made. In 14 resections of the ankle there were 78 per cent. of recoveries. It is best to operate as soon

as the diagnosis is made. Riedel prefers König's method. In 16 resections of the shoulder 12 were cured. In 4 resections of the wrist 3 were cured. As in the ankle, an operation should be made as soon as the diagnosis of tuberculosis is established, without reference to the age of the patient.

Mauclaire,¹⁸⁴ in an article on the different forms of tubercular osteo-arthritis, regards this disease as a local manifestation of a general lymphatic involvement. Hence the resection of a diseased part is not the radical cure which it is generally believed to be, for bacilli may be present in distant lymphatic glands. He emphasizes the fact that cultures of tubercle bacilli vary in virulence, and that different tissues vary in their resistance to the bacilli, which variability in both instances depends upon divers circumstances. Hence the character of the lesions produced and their intensity depend upon the action of these two uncertain quantities upon each other.

König²²⁸ classifies the modern treatment of joint tuberculosis as follows: 1. Radical local operation. 2. Local injections of medicaments. 3. Mechanical treatment. He rejects absolutely early resection, employs continuous traction to correct deformity, and applies an immobilizing apparatus of plaster, which is renewed with proper correction every six or eight weeks. He reports cures in fully half of the cases by these means. Certain others are cured by iodoformized injections. The remaining cases, and those of patients who cannot spend the time necessary for cure by these means, come to excision. Of 410 cases of tuberculosis of the hip at the Göttingen clinic, 150 were treated by extension and plaster splints, and 50 patients had, in addition, injections of iodoform in glycerin; 210 were subjected to excision, with a mortality of 19 per cent. In the knee 100 resections in adults from 20 to 66 years of age gave the following results: 12 patients died, 64 were cured, 16 recovered with sinuses, and 8 had to be subjected to amputation. In an investigation in 1888 the author was able to trace 70 of these patients: 44 were well and able to work, 6 had sinuses, and 20 had died, most of them of tuberculosis.

In Bardeleben's clinic³⁰⁹ there were, from April 1, 1890, to April 1, 1891, 32 resections, with 7 deaths, or 21.9 per cent.; of these 13 were of the hip, with 5 deaths, or 38.5 per cent.; and 8 of the knee. Of the latter, 4 came to amputation eventually.

An interesting discussion⁵⁷ on the treatment of tuberculosis of bones and joints was participated in by Dollinger, Verebely, Gerber, and Bartha. The general opinion seemed to be that fixation is all that is really necessary, extension being superfluous. Dollinger mentioned that 400 or 500 cases of coxitis had been treated, with no deaths, but with only about 1 per cent. total recoveries, the remainder of the cases retaining traces of the disease. Ettore Micheli⁵⁸ writes extensively on the treatment of articular tuberculosis, with especial reference to ignipuncture.

Max Scheimpflug¹⁵⁸ has published an exhaustive report on the expectant and initiative treatment of 455 cases of surgical tuberculosis in the "Erzherzogin Maria Theresia-Seehospize" from 1888 to 1891. The list includes 56 cases of caries of the vertebræ, of which 3 were cured, 17 much benefited, 18 unchanged, 11 grew progressively worse, and 7 died.

Aldibert, of Paris,⁴⁸ calls attention to tuberculosis of the diaphysis of long bones, particularly the femur, and thinks that the lesion is more common than is ordinarily supposed. The lower portion above the epiphyseal line is most often affected, in which case the epiphyseal cartilage may be injected or otherwise altered. When this condition of the cartilage is observed during a resection, Ollier recommends tunneling through the cartilage and removing the diseased focus. The ring of cartilage which is left is sufficient to continue the proper growth of the bone. Constant points of tenderness over the course of the bone assist in making a diagnosis. It is to be remembered that the affection probably does not exist without concomitant disease of the epiphysis. The author reports four cases.

An interesting discussion¹ on the management of suppuration complicating tubercular diseases of the bones and joints, held before the Medical Society of the State of New York, was participated in by V. P. Gibney¹¹⁷ Roswell Park, Louis A. Weigel,¹⁷⁰ and Henry Ling Taylor.⁹⁸ Gibney arrived at the following conclusions: "1. Protect the joint, about which the bone-lesion exists, in the early and later stages, whether the abscess is let alone, aspirated, or incised. 2. In cases where the suppurative process is confined to a small area, it is good surgery to leave the small abscesses alone if the protective appliance is adequate. 3. It is good practice to aspirate where the abscess is in the way of the proper

adjustment of apparatus, and by such procedure one may expect good results in at least 50 per cent. 4. The simple incision of an abscess dependent upon bone disease depends for good result upon the extent of the bone-lesion. 5. Excision of the hip is not a measure to be employed in all cases where extensive suppuration exists, but must depend largely upon the condition of the patient and the location and extent of the abscesses. 6. Expectant treatment for the knee- and ankle-joint in children yields the best results for life and limb. 7. Amputation of the ankle in a child is rarely ever justifiable; of the knee, is justifiable only when amyloid disease of the liver or kidneys threatens or is present; of a hip, after a thorough excision has failed. 8. The long-continued employment of a good-fitting splint to the back, in Pott's disease of the spine, will yield better results than any operative procedures on the bone with which I am familiar."

In an article entitled "Tubercular Arthritis with Fibro-plastic Hyperplasia and Fatty Degeneration of the Synovium," E. Nicaise⁹¹ describes a rare form of tuberculosis in which, instead of the usual fungous degeneration of the synovial membrane, a thick layer of fibro-plastic tissue is found, resembling somewhat a synovial sarcoma. Four cases are reported.

A. Lorenz, of Vienna,⁸² in an excellent paper, which was discussed by Albert and Billroth, considers the mechanical treatment of coxitis, referring, also, to tubercular diseases of other joints of the lower extremities. Fixation and the removal of weight from the part are the principles of mechanical treatment. An apparatus should allay pain, promote sleep, and permit of the patient spending as much time in the open air as possible. These requirements are best fulfilled by close-fitting plaster models of the parts, re-inforced, when necessary, by iron supports. The benefits of extension he regards as due merely to the fixation obtained. He does not attempt to remedy the slight deformities found in the earlier stages of coxitis, but the abduction present in old cases must be corrected; the local anaesthesia produced by intra-articular injections of cocaine being sufficient for this purpose. Albert, of Vienna, in the discussion, spoke of the inadequacy of extension, and even of resection, although these have been so extensively employed; and emphasized the fact, just beginning to be appreciated in Germany, that in joint tuberculosis in children recovery

often takes place without resection. In fifty cases treated conservatively by Albert, the mortality was zero. Abscesses seemed to have no influence on the results. He spoke strongly in favor of ignipuncture. Billroth, of Vienna, agreed with Albert as to the uselessness of resection in coxitis. He had never seen union by first intention, and had never had a really good result. The Hessing apparatus he regarded as of little or no benefit.

Miller, of Edinburgh,³⁶ gives statistics based on 30 cases of resection of the knee-joint for tubercular disease. The results were characterized as "very good" in 5 cases, "good" in 15 cases, and "fair" in 1 case. Secondary amputations for recurrence were made in 4 cases. One case died shortly after operating, and in 1 case the disease soon returned. In the remaining cases sufficient time has not elapsed to make the results of value.

In operating, he makes an incision below the patella, deeply curved downward toward the tuberosity of the tibia, and another straight across the centre of the patella, joining the ends of the first. The upper flap is then reflected upward, the tendon of the rectus and adjacent muscular fibres divided, and the entire anterior portion of the capsule, together with the patella and an elliptical portion of skin, stripped downward and removed *en masse* by cutting through the patellar tendon and tibial attachments. The remainder of the joint is then cleaned up, bones resected, etc. It is claimed that the removal of redundant skin is in itself an advantage.

He does not believe in resecting the knee-joints of very young children, on account of the risk of obtaining an atrophic limb; amputation is preferable, as it also is when a large amount of bone must be removed. An excision should not be made when there is extensive disease of the soft parts, because recurrence is almost inevitable. Amputation is better when tubercular disease exists elsewhere; also when the patient is beyond the prime of life. Sepsis may contra-indicate resection at times, but certainly not often.

We have recently employed Miller's method of operating in a case of extensive tubercular disease of the capsule and bones of the knee-joint, and can recommend it as an exceedingly satisfactory procedure for gaining access to and thoroughly removing the diseased tissues.

At the recent French Surgical Congress, le Dentu, of Paris,¹⁴ recommended the employment of Senn's bone-chips in cavities left after operations for tuberculosis of the foot. Ollier, of Lyons, uses iodoform gauze for this purpose, and in non-tubercular cases packs the cavities with masses of catgut. Ch. Audry, of Lyons, believes that osteo-articular tuberculosis is much more amenable to permanent cure than is generally supposed; and that it is an error to think that after ten years all cases which have been operated upon will have died. He mentions several cases of tuberculosis of the tarsus, operated on over thirty years ago, which have not relapsed. In fact, the case is comparable to that of carcinoma; the first two years following the operation being the most dangerous, the prognosis gradually bettering itself as time passes. Audry and Mondan, of Lyons, mentioned that, in 167 cases of tuberculosis of the foot, 27 originated in the synovium, 113 were of osseous origin, and in 25 the point of origin could not be determined. The calcaneum was diseased in 40 cases, and in 28 of these the focus was central. He distinguishes four types of tuberculosis of the foot:

1. Metatarsal and phalangeal lesions, which are the most frequent.
2. Lesions of the anterior portion of the tarsus, which are found more often in conjunction with disease of the posterior tarsus.
3. Lesions of the calcaneum, which have a tendency to remain localized; if they do extend, it is toward the astragalus.
4. Tibio-tarsal lesions, which generally originate in the astragalus, but may originate in the bones of the leg.

Lannelongue, in speaking of the early stages of bone tuberculosis, stated that the first principle in their treatment was absolute rest. It is rare, however, that rest is alone sufficient, and it is advisable to employ injections of chloride of zinc, with which many absolute cures have been obtained without operative interference. Coudray, of Paris, spoke favorably of Lannelongue's treatment. Ollier spoke strongly in favor of his method of removal of the astragalus in tuberculosis of the tarsus, being seconded by Reverdin, and gave three reasons therefor: (1) the astragalus itself was found diseased 29 times and its synovium 22 times in 86 cases; (2) if the leg-bones are affected, astragalectomy facilitates the exposure and removal of their diseased articular surfaces; (3) there is no danger of obtaining a loose joint. Poncet was in favor of operative interference as soon as the diagnosis was established. In patients of 40 years or more

amputation is to be preferred to tarsectomy; but under the age of 15 or 16, and especially under 12 years of age, an amputation should not be performed. Resections are in place when the posterior tarsus is affected; but in the metatarsus and anterior tarsus mere curetting often gives excellent results, especially when accompanied by a vigorous use of the thermo-cautery. Phocas, of Lille, called attention to the comparatively benign nature of tuberculosis of the foot; in twenty cases he had seen but two deaths, due to generalization of the tubercular process.

Tuberculosis of the shoulder is considered, in a comprehensive article, by Mondan and Ch. Audry, of Lyons.⁹¹ Ollier's subperiosteal resection is strongly recommended.

One hundred and thirty-seven cases of tuberculosis of the wrist, treated in König's clinic in Göttingen, are reported by Kosima.⁸⁰¹ Out of 80 cases of resection, which were kept under observation, 28 died, 45 recovered completely, and 7 made incomplete recoveries; 3 deaths occurred shortly after the operation, leaving 25 subsequent deaths, all related in some way to the tubercular affection, 20 of them being from pulmonary tuberculosis. In 73 per cent. of the cases operated upon, union by first intention was obtained. Among the 45 complete recoveries 27 obtained more or less movement and good function, 15 obtained ankylosis in good position and satisfactory function, and 3 obtained useless flail-joints. Twenty-five cases were treated by the conservative methods of partial resection, curetting, etc. The results of 8 of these cases are unknown. There were 8 complete recoveries, 1 incomplete recovery, and 8 deaths. The mortality was thus greater than in resection or amputation, and the recoveries not so many. The best guarantees for a successful and permanent result are the youth of the patient, a localized lesion, and an extensive and early resection.

Sacro-iliac Disease.—Disease in the sacro-iliac articulation is discussed by Ridlon, of Chicago, and Jones, of Liverpool.⁹² Mechanical treatment is not very successful, as it is difficult to immobilize the sacro-iliac joint; but, nevertheless, the Thomas double hip-splint, with certain modifications, may be tried. As soon as suppuration begins, the joint should be opened and all tubercular material removed. If an abscess is detected within the pelvis, through the rectum, it may be drained by trephining the ilium.

There seems to be less risk in operating several times for possible relapses than in the employment of a drainage-tube. Makins² reported before the Clinical Society of London three cases of sacroiliac disease. He urged that the prognosis is better than is usually asserted. The disease should be treated on the same general principles as other tubercular diseases of joints. Sir Dyce Duckworth said that the old treatment by actual cautery of the overlying skin had gone out of use, but that it formerly gave good results.

Osteomalacia.—In an interesting article on the treatment and diagnosis of osteomalacia, Maximilian Sternberg⁸ says that, according to the analysis of eleven cases, phosphorus is, in all probability, a reliable remedy, as is also castration. In young, sexually capable women with very narrow pelvis, castration is to be preferred; in all other cases an energetic course of phosphorus is to be carried out. Hence an early diagnosis of the disease is very desirable. It must be differentiated from diseases of the nervous system, the joints, and the bones.

At a meeting of the Vienna Medical Club Weissmayer⁵⁷ showed a shoemaker, aged 52, who took ill three years ago with great pains in the upper parts of the thighs, through which he was finally confined to bed. In August he was brought to the hospital, when nothing abnormal could be observed except a slight flattening over the second, third, and fourth ribs of the right side. There appeared to be much pain in all the bones, with contraction of the abductors. Carcinoma, lymphadenia osseum, and multiple myeloma were excluded. The diagnosis, therefore, reverted to osteomalacia, which in males at this age is comparatively rare. The treatment confirms the diagnosis. Two months after commencing 1-milligramme ($\frac{1}{64}$ grain) doses of phosphorus, which was gradually increased from 2 to 3 milligrammes ($\frac{1}{8}$ to $\frac{1}{4}$ grain) per day, the strength rapidly returned, till the patient is now able to move about without assistance. Schlesinger recorded a case of a similar nature where, after two months' treatment with phosphorus, equal success was obtained. In this case, however, there was a remarkable history of six years' confinement to bed before the treatment was commenced. He, however, warned practitioners against the use of large doses of phosphorus, as acute poisoning was easily induced. One to two milligrammes ($\frac{1}{64}$ to $\frac{1}{8}$ grain) per day should not be exceeded for some time.

Sternberg recommends the following prescription :—

R Phosphor..	0.05 gramme ($\frac{1}{2}$ grain).
Ol. jecor. aselli,	50.0 grammes (1 $\frac{1}{2}$ ounces).
Sig.: Two teaspoonfuls once a day.	

He has used this formula without untoward effects. There is little danger of chronic poisoning and necrosis of the bones. In many cases it is better to give smaller doses, more frequently.

Tschistowitsch ¹³ was not able to find in the blood the micro-organism described by Winogradsky, nor could he obtain any growth either in the medium suggested by that observer or in ordinary peptonized bouillon. Testing, according to Petrone, for nitrous acid in the urine, he failed to obtain decisive results. The formation of red blood-corpuscles was diminished at times and at other times went on well, but there was a diminution in haemoglobin. As far as the white blood-corpuscles were concerned, the lymphatic elements were increased, the mono-nuclear cells diminished, and the eosinophile cells variable.

Osteomalacia is also discussed by Latzko, ⁵⁷ who, in connection with Jolles, has demonstrated the constant diminution of urates in the urine, and the irregular appearance of propeptides and nitrates. As Petrone has suggested, the disease may be due to a parasitic micro-organism. The latter also claims that this micro-organism is destroyed by chloroform when used as an anaesthetic; which may help to explain the cures resulting alike from castration, Cæsarian section, and Porro's operation. Latzko succeeded in curing one case by chloroform narcosis alone, which seems to support this view. The author concludes: 1. In women who are not pregnant, internal medication should be resorted to. Castration should be employed in women who are fully developed sexually, and in whom internal medication has proved ineffective. 2. In pregnant women with absolute narrowing of the pelvis, the choice lies between Porro's operation and artificial abortion. When the narrowing of the pelvis is relative, symphyseotomy is indicated.

Osteomyelitis.—Lucet ¹⁴ has carefully investigated the infectious osteo-arthritis which appears in young geese, and which closely resembles that of man. The disease manifests itself, in an acute or chronic form, about the time of the appearance of the first feathers, and is due to the presence of a micro-organism which is

probably the staphylococcus pyogenes. Poncet²¹¹ discusses latent osteomyelitis, a form of the disease which may remain more or less inactive for years, manifesting itself by occasional pain and tenderness and perhaps slight enlargement of the bone. When certain portions of the osseous system are affected with the ordinary acute form of osteomyelitis, the latent form may manifest itself in some other portion. It is a mild form of streptococcus or staphylococcus infection. Two cases are cited, both of the humerus, and both following acute osteomyelitis of the tibia.

Hypertrophic Pulmonary Osteo-arthropathy.—From Australia comes the report of a case of this rare disease, by J. W. Springthorpe, of Melbourne.²⁸⁵ He suggests that the affection "may be the result of exceptional abnormality of nutrition, under the influence of continued and uncommon mal-oxygenation of the blood." Ichthyosis was present in the case,—a complication not before observed in connection with this disease. Moizard¹⁴ describes two cases of pulmonary osteo-arthropathy in infants, aged respectively 5 and 6 years. Thibierge¹⁴ reports two cases of Paget's disease, making thirteen cases observed in France, and fifty in all since the affection was first described, in 1876.

Necrosis.—Two cases of primary necrosis of the pubes, one in a baby of 11 months and the other in a child of 5 years, are reported by Morton, of Bristol, Eng.²

Bone-Growth.—Julius Wolff, of Berlin,²⁰⁶⁸ in his new and valuable work on "The Law of the Transformation of Bone," dwells upon the proposition established by himself in 1871, that the bones are capable of accommodating themselves in their structure to new statical conditions,—that is, to new conditions of pressure and extension,—so that in the course of time they acquire a form and structure fully capable of carrying out their new functions. This proposition is fully discussed in all its practical and theoretical relations; for instance, in reference to genu valgum, scoliosis, etc.

Syphilis.—Renard, of Lille,⁸⁵³ has written extensively on syphilis of the bones in children. He emphasizes three propositions: 1. Early congenital syphilis rarely attacks the bones, while in the later forms osseous lesions are very frequent, coming next to lesions of the eye in that respect (thirty-eight cases out of one hundred). 2. The long bones are affected much oftener than the

short or flat bones. 3. In by far the greater number of cases the clinical form of the disease is an osteo-periostitis; while internal and external gummatous lesions of the bones are rarely seen. Lannelongue, in 1881, described a particular deformity of the tibia, calling the curved and flattened bone a "sabre-tibia." This he regarded as characteristic of hereditary syphilis. Renard, however, seems to have demonstrated, by means of cases in point, that the deformity may originate from either acquired or hereditary syphilis. The reason it is never seen in adults is because it only occurs in bones which are undergoing development. Hereditary syphilis generally lies at the bottom of the difficulty, however, because it is much more frequent in children than is the acquired form, although the latter is not so rare as has been supposed.

Achillodynbia.—Albert, of Vienna,¹¹⁸ calls attention to an affection which he has named achillodynbia. There is slight swelling about the insertion of the tendo Achillis, with pain on standing or walking, but with little tenderness on pressure. It differs from Raynal's "peritendinous cellulitis," and is not improved by hot or cold applications, nor by iodine or mercury. A case of achillodynbia is reported by A. A. Eshner, of Philadelphia.¹¹⁹

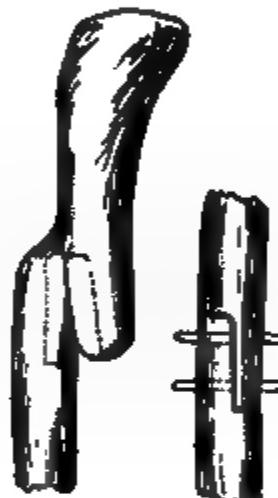
Metatarsalgia.—This subject is discussed by A. E. Hoadley, of Chicago.¹²⁰ As originally described by Morton, the affection consists of a "neuralgia of one of the digital branches of the external branch of the internal plantar nerve. In nearly every instance pain exists at the metatarso-phalangeal articulation of the fourth toe," and "is almost always associated with the wearing of a closely-fitting shoe." The pain often comes on suddenly and is very severe. Hoadley does not agree with Morton, that the relative position of the metatarso-phalangeal articulations of the outer toes has something to do with the neuralgia, but attributes it to compression of the digital nerve by folding of the foot on itself from lateral pressure. Tight, thin-soled shoes are thus usually the chief cause. Many cases recover by the use of wider shoes, with stiffer soles. In refractory cases the digital nerves may be resected, it being hardly necessary to resect the joint, as has been recommended.

Lead Poisoning.—E. Küster and L. Lewin¹²¹ report a severe case of this affection arising from a bullet lodged in the tibia.

Pseudarthrosis.—A. Schreiber³⁴ writes extensively on the prevention and treatment of pseudarthroses. He agrees with Bruns, that delayed union occurs once in every 70 to 80 cases of fracture, and pseudarthrosis in every 200 to 250 cases. He emphasizes the desirability of carefully investigating the position of the fragments in a recent fracture, as regards their relations to themselves as well as to the surrounding soft parts; if necessary, under an anæsthetic. After dwelling upon the various methods which may be employed, including the deep injection of Lannelongue's 10-per-cent. solution of chloride of zinc, he states that in most cases of definite pseudarthrosis it will be found necessary to cut down on the fracture, resect the ends of the bones, and remove intervening soft parts, etc. Resection is always indicated when the fragments are in position, but are movable and atrophied, the intervening fibrous tissues having lost the power of forming new bone. Bone-sutures, nails, or dovetailing of the fragments may be employed. In no case should the periosteum be disturbed more than is absolutely necessary; and it is even desirable, in denuding the ends of the bones, to remove a shell of bone with the periosteum, when this can be done. The ends of the bones should not be protruded through the wound, and hence a chisel is to be preferred to a saw. The illustrations show desirable methods of coaptation of fragments.

Although the mortality of resection combined with bone-suturing in pseudarthroses is as high as 20 per cent. (Tillaux), and although many cases recover with resection alone, especially when aided by extension, nevertheless, there is not sufficient ground for discarding the suture. Platinum wire still remains the best material.

Suppuration is never desirable. It may sometimes be of advantage to use an antiseptic tampon instead of closing the wound



PSEUDARTHROSIS. (SCHREIBER.)
Münchener medicinische Wochenschrift.

at once. The transplantation of bone, bone-periosteum flaps, etc., has its uses in certain cases (Rydygier, Nüssbaum, Blagowestchensky, Sherwood, and Müller). The number of cases of pseudarthroses has heretofore been about 50 per cent.; by the use of the above methods, the author hopes that the number may be greatly reduced.

V. Wille,²³⁸ describes a new and effective method of suturing the ends of broken bones. He overcomes the great difficulty in the present method, of threading the suture-wire through the holes after they are drilled, by catching the wire in a "suture-hook" introduced through the return-hole. This can be done without bringing the wire into sight at all. With this procedure, the

SUTURING ENDS OF BROKEN BONES. (WILLE.)

bone may be drilled squarely through both fragments, and not slanting, as was formerly the case. (See illustrations.) The periosteum need not be extensively disturbed.

An original method of suturing ununited fractures is described by Dollinger,³³ which he has successfully employed in two cases. Instead of perforating the bone in the usual manner, a ring of wire is laid loosely around each end of the fragments and straight pieces of wire placed on either side, with their extremities beneath the rings, which latter are then twisted tight. The longitudinal wires are bent over and their ends united on either side, thus holding the fragments firmly in place.

A new osteoplastic operation of use in pseudarthroses of

superficial bones has been done on the tibia by W. Müller, of Aachen.³³⁶ It is especially applicable where one of two parallel bones is broken and a considerable defect exists between the fragments. A flap, including skin, periosteum, and a layer of bone, is chiseled from one of the fragments adjacent to the pseudarthrosis, and twisted on its pedicle so as to bridge over the defect. All the wound surfaces are then sutured together as far as possible. Callus is thrown out at once, and healing takes place rapidly.

Bone-Tumors.—Surgical intervention in tumors of the scapula is discussed by Jeannel.¹⁰⁶⁸ A. H. Pilliet⁷ mentions a cystic chondroma adherent to the head of the fibula, and calls attention to the difficulties of diagnosis between this rare affection and osteosarcoma. Félixet, in discussing the case, stated that he had operated on a similar tumor in the same region, as did also Désir. All were in comparatively young subjects. W. von Noorden³⁰ reports the removal by Mikulicz, of Breslau, of two immense chondromata of the trunk. In one of the operations a portion of the diaphragm the size of a saucer was cut away, the patient making a good recovery. Edmund E. King³⁰ describes an osteochondroma of the hand, the illustration of which is here reproduced.

W. W. Van Arsdale, of New York,²⁶ reports an ossifying haematoma of the arm, following an injury, and calls attention to the fact that these rare tumors may be easily confused with malignant growths.

Exostoses.—Brunon²²⁸ discusses the subject of osteogenetic exostoses, or "exostoses of development," and gives the description of a case. The outgrowths, which appear at the epiphyseal lines, arise from the cartilages at those points, in connection, perhaps, with the periosteum, while exostoses of the diaphyses probably arise from the periosteum or bone. O. Dige, of Skive, Denmark,³⁷³ reports a case of multiple exostoses in a boy of 14 years, in whom the appearance of the tumors "in various parts of the skeleton, at points distant from the epiphyseal junctions,

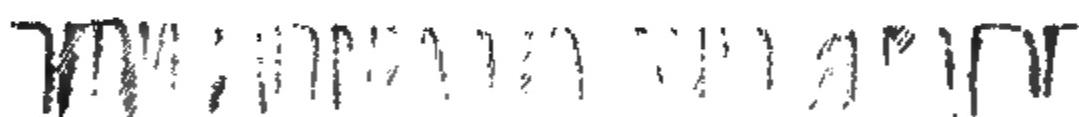
OSTEOCHONDROMA OF THE HAND.
(KING.)
Canadian Practitioner.

and not traceable to some recognized constitutional diathesis, would tend to confirm the 'hypothesis' advanced by Virchow in 1858, that exostoses, or 'enchondromata,' as he has termed them, are not mere benign hyperplastic swellings due to inflammation, but are heteroplastic tumors, which may become malignant at some time during their development; in other words, they are 'neoplasms.'

The successful removal of exostoses through the joints in two cases is reported by Arthur Barker, ¹⁹⁰⁶, the tumors having invaded the articulations.

Attention is called (Hutchinson ¹⁹⁰⁶) to the formation of wing-like exostoses on the bones of turkeys, which seem to be the only birds affected in this manner.

Ostmann ¹⁹⁰⁶ considers the subject of exostoses of the external



MYOSITIS OSSIFICANS. (STONHAM.)
London Lancet.

bony auditory canal in different races. In 2633 skulls, exostoses were found 16 times. The affection was most frequent in the skulls of Americans, especially ancient Peruvians. Africans, Asiatics, and Europeans seem to be comparatively free. Ostmann believes that the peculiar anatomical characteristics of the Peruvian skulls is intimately connected with the abnormal growths in question.

Myositis Ossificans.—In quite an exhaustive paper, Charles Stonham, of London, ¹⁹⁰⁶ considers the present position of our knowledge of myositis ossificans, with reports of cases (see illustrations). The bibliography of the subject is given. He arrives at the following conclusions: 1. The disease is associated with a congenital, but not hereditary, predisposition to the formation of bone

in inflamed parts. 2. It is closely allied to muscular rheumatism and rheumatoid arthritis. 3. It runs an essentially chronic course over many years, steadily progressing, but with distinct remissions, and may extend over a long period, beginning usually in early life, especially in the male sex. 4. The muscles of the back and shoulders are the earliest and the most extensively affected; those muscles of great importance to the life of the individual almost always escape. 5. Local injury must be accepted as a great causative factor in producing fresh foci of disease. 6. It is sometimes associated with hallux valgus and microdactylia. 7. Death usually occurs from pulmonary complications, or suppuration and sloughing, with septic absorption. 8. Treatment is useless.

A case, in a young man of 20, is reported by Brennolin.⁴⁴ Quite a large number of muscles were involved, including all those of the back, the boundaries of the axilla, the deltoids, serratus magnus, biceps, brachialis anterior, neck muscles, abdominal muscles, and the muscles of the thigh. Another case of extensive myositis ossificans is described by Bilton Pollard, of London.

MYOSITIS OSSIFICANS. (STONHAM.)
London Lancet.

DISEASES OF JOINTS.

Tuttle, of New York,¹ gives an excellent account of our present knowledge of internal derangements of the joints, including loose or movable bodies. He gives the following table of cases for comparison, collected by different writers:—

	Cases.	Cured.	Failures.	Mortality.
Benndorf,	216	66.2 per ct.	18.99 per ct.	14.99 per ct.
Larrey, 1860,	167	68.86 "	17.76 "	11.38 "
Barwell, 1884,	88	82.95 "	5.68 "	11.36 "
Tuttle, since 1885,	107	97.19 "	2.81 "	

The absence of deaths since 1885 is due to the advent of anti-septic and aseptic methods.

Olinto, of Brazil,¹¹⁸ has written on polyarthritis deformans in children. But 39 cases have been reported in children under 15 years, 14 of which were between 2 and 5 years. The prognosis is not always favorable; and cases exist, as in adults, where all medication fails.

In an article on rheumatic arthritis, Hugh Lane, of Bath,⁶ insists on the careful differentiation, for purposes of treatment, of rheumatic arthritis from rheumatoid arthritis. The former is an affection of rheumatic origin, local in character, in which the neural element is absent. The latter is a general disease of debility, having no connection with rheumatism, in which the neural element plays a conspicuous part, and which occurs in cases with strong hereditary histories of gout, struma, or phthisis, its last stage being osteo-arthritis. John Kent Spender, of Bath,¹⁵ has written on the dietetic and medicinal treatment of rheumatoid arthritis.

Paul Thiéry,⁷ recommends early arthrotomy as a measure tending to prevent ankylosis in cases of blennorrhagic arthritis, and reports a successful case. The elbow-joint was opened in one case by a posterior vertical incision with transverse section of the olecranon. The cartilages were unaffected, but the synovium was inflamed and covered with granulations. The larger part of the membrane was removed and the remainder thoroughly cauterized with chloride of zinc (1 in 20). The joint was then closed without drainage. The restoration of movement was almost complete. Rendu,¹⁴ reports the cure of an acute, suppurative, blennorrhagic arthritis by aspiration and injection of 3 hypodermatic syringefuls of bichloride of mercury (4 to 1000).

Syringomyelic Arthropathies.—Charcot⁷³ _{Apr. 20} emphasizes the possibility of the occurrence of marked joint-lesions before the symptoms of spinal disease manifest themselves to any great extent. He calls attention to the close similarity between the joint-lesions of tabes dorsalis and those of syringomyelia; but while the former disease affects the lower extremities (76 per cent.), the latter confines itself to the upper. Osteomata of the tendons, muscles, etc., are found in both diseases, but more frequently in syringomyelia. If only the local conditions were considered, it would be difficult to differentiate the two affections. The joint-lesions may be divided into the atrophic form, which is rare, and the hypertrophic form, which is more common.

J. C. Oliver, of Cincinnati,⁵³ _{July 22} describes three interesting cases of hysterical contractures of the ankle-joint which were treated by isolation, massage, etc., and which promptly recovered.

Suppurative Arthritis.—Otto Lanz, of Bern,⁵⁰ _{Sept. 1} has carried out a number of experiments with an heretofore undescribed bacillus, which he proposes to call *Bacillus pyogenes foetidus liquefaciens*. The micro-organism was originally obtained from a foul-smelling brain-abscess, and produces during its growth the foulest of odors. Injections of cultures into animals are followed by a suppurative polyarthritis,—the first instance, except perhaps the tubercle bacillus, according to the author, in which a bacillus has been found as the cause of suppuration within a joint.

Flail-Joints.—V. Ménard⁸⁵³ _{Nov. 22} discusses “flail-joints” remaining after recovery from severe forms of tuberculosis of the hip, with dislocation of the femur. The usual mode of recovery is, according to Lannelongue, by fibrous ankylosis, although loose joints at times result. The condition must be discriminated from congenital luxation, especially from congenital luxation with arthritis.

Ganglion.—H. Martyn Jordan⁶ _{July 22} reports the successful treatment of twenty-five consecutive cases of ganglion. He thinks that the cysts arise from hernial protrusions of synovial membrane through slits in the sheaths of the tendons. His method of treatment consists in aspiration, followed by the injection of sufficient Morton’s fluid (10 grains—0.65 grammes—of iodine, 30 grains—2 grammes—of iodide of potassium, and 1 ounce—30 grammes—of glycerin) to partially fill the sac. The part is then manipulated

to distribute the injection, and a pad bound tightly upon it. After one year and nine months there had been no relapse in any of the cases, all having been heard from except one.

PLASTIC SURGERY.

Skin-grafting.—Interesting articles on the Thiersch method, which seems to be continually gaining favor, have appeared by Stanley Stillman, of San Francisco¹⁴⁷; C. H. Mayo, of Rochester¹⁰⁵; and J. H. Dunn, of Minneapolis.¹⁰⁵ Dunn reports a death following the grafting of a large burn. He suggests the absorption of toxic substances, due to the disturbance of the granulations, as a probable cause. It is possible that amyloid disease may have been a factor in the patient's death, for the author states that irritability of the bowels had been present for some time, and that suppuration had been going on for a year. The condition of the urine is not mentioned. At a meeting of the New York Surgical Society, F. W. Murray,¹ called attention to the secondary formation of cicatricial tissue which sometimes appears beneath and between Thiersch grafts, having an appearance, in some instances, like false keloid, and giving rise to more or less secondary contraction. This formation may take place even when the grafting seems at first to be successful in every respect. Lange, Kammerer, and McBurney had noticed the same phenomenon. McBurney thought that the too-early replacement of the wet dressing by a dry one had much to do with this cicatricial formation, it being better not to remove the wet dressing for two weeks. Pilcher had also noticed the formation of keloids. He spoke, in addition, of a peculiar purpuric eruption which appeared, in one instance, in the grafts and over the surface from which they had been taken, as soon as the patient left his bed, but disappeared when the bed was resumed. Fowler thought the keloids were produced by the same causes which always produced them.

Francis S. Watson, of Boston,⁹⁹ states that in the application of skin-grafts according to the Thiersch method it is unnecessary to curette the surface to be grafted, "provided it be covered by healthy, fresh, red, flat granulation tissue." James Bell, of Montreal,²⁸² reports 36 cases of skin-grafting according to Thiersch, with 33 good results. M. B. Aldrich, of Fall River, Mass.,⁹⁹ has had considerable success in grafting with the skin of pigeons.

F. Krause, of Altona,²⁰⁰³ claims that neither the Thiersch method of skin-grafting nor the method by means of pedunculated flaps is satisfactory in many cases. He has endeavored to re-introduce, with modifications, the "second Indian" procedure, in which large unpedunculated skin-flaps are used. It is necessary that the operation should be an absolutely aseptic one, and that the flaps should include no subcutaneous fat. It is best to operate dry; and all haemorrhage must be checked by compression. If the wound is not a fresh one, the granulations must be removed with a sharp spoon, and the ulcer sterilized with sublimate, which must subsequently be washed away with salt-solution. If a hard, connective-tissue basis is present, it must, as far as possible, be cut away until normal tissue is reached. Haemorrhage is controlled during the operation by use of the Esmarch tube, which is not removed until the dressings have been applied. The flaps may be removed from the arm, thigh, or nates; and should be spindle-formed, so as to admit of closure of the wound at once. They can afterward be cut to fit the ulcerated surface. One end of the flap is raised with forceps, and in dissecting it from the subcutaneous fat the edge of the knife is used almost perpendicularly to the skin to be removed. On the extremities it is unnecessary to suture the flap in place; this is desirable, however, on the face. Krause has operated upon twenty-one patients, employing more than 100 large flaps, and of these only 4 were completely lost. The flaps "take" equally well on muscle, fascia, connective tissue, periosteum, dura mater, or even freshly-denuded bone. Healing takes place in three to six weeks. As the entire thickness of the skin is employed, the hairs are also transplanted; and in this manner an absent eyebrow, for instance, may be replaced from the scalp.

The author lays much stress on the observance of many small details during the operation, which are carefully pointed out in his article on the subject.

After removing the entire cheek for carcinoma, Schimmelbusch²⁰⁶⁹ filled in the defect with flaps from the neck and scalp. The neck-flap, which reached nearly to the clavicle, was turned skin-side inward, to replace the buccal mucous membrane; and the section of scalp, with its hairy surface outward, was used to cover in the raw surface of the first flap. In this way the beard was replaced and cicatricial contraction prevented, the

jaw-movements being preserved. The pedicles were cut in four weeks.

F. C. Schaefer,⁶¹ reports a case in which the entire scalp had been torn off by machinery, and the granulating surface successfully grafted according to the method of Reverdin. He has collected the histories of six other similar cases. He advocates the employment of small dermal grafts, including a few fibres of connective tissue, placed not farther than five millimetres apart. Bruce Clark² has written on the treatment of lupus of the face by free removal and skin-grafting with large flaps.

Bone.—A. Schmidt²²⁸ gives the present status of osteoplastic surgery, with a review of the various methods and descriptions of a number of original experiments.

Von Eiselsberg⁵⁷ has successfully replaced portions of the skull with plates of celluloid in two cases. In a third case the celluloid had to be removed. He considers that union by first intention is necessary to the success of the operation. F. Kappner⁸⁴ filled in a defect in a skull with pieces of bone from the skull of a young goose.

Julius Wolff, of Berlin,⁴¹ proposes to fill in defects of bone by separating a layer from the neighboring bone and sliding it into the defect by means of the loose fibrous connection between periosteum and skin. This differs from König's method in that no skin-flap is formed. Several cases are reported, three of them being successful operations for "saddle-noses." B. F. Curtis, of New York,⁸¹⁴ reports four cases of bone-implantation and transplantation for the purpose of filling cavities of various kinds.

It has formerly been held that pieces of bone which were completely divided from their surroundings and then replaced, or implanted in some other portion of the body, not only retained their vitality, but even grew in their new situations. A. Barth, of Marburg,^{2003, 336} however, in a series of experiments on animals, found that such pieces of bone invariably became necrotic, irrespective of whether they healed in, as is generally the case, by becoming encapsulated with fibrous tissue, or by osseous union with the neighboring bone. When bony union occurs, the old bone is not absorbed in the usual sense and new bone afterward formed in its place, but the osteoblasts penetrate directly into its

substance, and a species of "substitution" of living for dead bone takes place.

W. J. Walsham,² successfully treated two cases of elongation of the ligamentum patellæ, with recurring spontaneous dislocation of the patella itself, by transplantation of the tubercle of the tibia, with the tendon attached, to a point lower down on the bone. A similar procedure is useful in other deformities. Walsham has transplanted the posterior tubercle of the os calcis, with the tendo Achillis attached, in order to overcome the elongation of the calf-muscles in paralytic talipes calcaneus. Keetley has removed a wedge of bone from the patella, and shortened the internal aponeurosis, in a case of abnormal lateral mobility with a tendency to outward dislocation on kneeling. Greig Smith, of Bristol, has shortened the ligamentum patellæ, in a similar case, by resection and herring-bone-stitch sutures of kangaroo tendon.

Duplay and Cazin, of Paris,³⁶⁰ have conducted a number of experiments on animals to determine the value of various aseptic substances in the filling in of cavities in bone. The best results were obtained with pieces of sponge sterilized in steam for half an hour. This method of sterilization, of course, renders the sponge useless for other purposes, but does not injure its value as a packing for bone-cavities. In five days the interstices of the sponge become completely invaded by granulation tissue, and, when ossification is almost complete, but a few silicious spiculæ remain. Catgut is less-easily sterilized, and hence less reliable. Sterilized gauze is also an excellent substance for use in this connection. It being very difficult to at once sterilize large and irregular cavities in bones, the authors recommend a provisional tampon, for the purpose of procuring asepsis of the cavity, before the permanent tampon is put in place. The question, however, has not yet been definitely and practically solved.

H. Dreesmann, of Bonn,³⁶¹ describes a new process of "filling" bone-cavities, as one fills teeth, with plaster of Paris. The process has been successfully carried out in several cases. There is no sinking in of the cicatrix, and it does not become adherent to the bone,—a point of much importance about the face. The process of healing is much shortened and simplified. The essential and difficult point is to secure absolute asepsis of the cavity, together with complete removal of all diseased tissues. Asepsis may be

obtained by filling the cavity with olive-oil, into which is plunged the glowing point of a thermo-cautery, thus bringing the oil to ebullition. The plaster is made into a paste with 5-per-cent. carbolic acid.

Oscar J. Mayer, of San Francisco,²²⁰ working in Sonnenburg's clinic, in Berlin, has demonstrated that copper-amalgam may be advantageously used for the purpose of filling cavities in bone. He claims that the continuous antiseptic action which it exercises is of much advantage. Both these methods are yet too new to pronounce upon their practical usefulness.

Guermonprez²²¹, calls attention to injuries of the hand in which one or more fingers have been rendered useless by cicatricial contractions, ankyloses, etc., thus destroying, by their presence, the utility of the remainder of the hand. It is better, under these circumstances, to sacrifice the disturbing members; and, in suitable cases, remove the bones and employ the soft parts which covered them as flaps with which to remedy any defects which may exist in adjacent tissues. Among other conclusions, the author states that an autoplasic operation, with removal of a bone from a finger, is indicated when a large amount of tissue has been lost through a burn, through injury by machinery, etc. The soft parts should be removed close to the fibrous sheaths of the tendons, in order to preserve the integrity of the vessels and nerves.

Finney²²⁴ successfully replaced the ends of the middle and ring fingers seven hours after they had been cut off.

FRACTURES AND DISLOCATIONS.

BY LEWIS A. STIMSON, M.D.,
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FRACTURES.

Direct Fixation of Fragments in Compound and Ununited Fractures.—Senn,⁹⁹ in a formal paper, read as the President's Address to the American Surgical Association, argued in favor of direct fixation of fragments in compound fractures and in ununited fractures (failure of union), by hollow bone cylinders introduced into the medullary canal, or by bone ferrules encircling the fragments in cases "in which perfect retention cannot be secured by simpler measures," and also in "certain forms of subcutaneous (simple) fractures in which reduction and retention cannot be accomplished without it." The author, recognizing the grave objections to the use of ivory or bone pins introduced into the medullary canal, has devised hollow, perforated cylinders, "made of the shaft of the long bones of young animals, such as chickens, turkeys, or rabbits," which are less objectionable because absorbable. He prefers, however, external support by a thin ring of bone embracing both fragments. He reported three cases in which such rings had been used: ununited fracture of the femur, of the humerus, and compound comminuted fracture of the leg.

Fixation of Fragments by Direct Means.—Keetley⁶₁₀ proposes to prevent shortening and other displacements, in simple as well as in compound fractures, by direct fixation by means of two steel pins introduced through the soft parts and firmly driven into holes previously drilled in the bone. Each pin has a long arm at right angles to its shaft, one pin is fixed in each fragment in a hole drilled in its side as near to the line of fracture as seems suitable for a secure hold, reduction of all displacements made under them, and the arms of the two pins bound together side by side over a pad of iodoform gauze placed between them and the skin. He reports ten cases. The same author, in another paper read before the Medical Society of London,²₁₁ argued in favor of

attempting to prevent shortening and other forms of faulty union, after fracture, by pins of steel to be introduced into the fragments and then bound together outside of the limb in such a way as to secure immobilization. The proposed plan "essentially consisted in the insertion of two pins of steel, thickly plated with silver, one into each fragment of the bone, not too near the fracture. Each pin had an arm at right angles to it; these two arms, lying outside of the skin, were lashed together with silver wire after the fracture had been accurately adjusted. No incision was made, each pin being passed in through a simple puncture. The bones were perforated for the pins by Keetley's patellar brad-awl. Two cases were described and one shown. The author recommended that the operation should not be resorted to until ten days or a fortnight after a fracture, so that there might be time to see what results ordinary modes of treatment were likely to give, and also that there might be time for effused blood to be absorbed or organized." In the discussion that followed, it was evident that the propositions were not viewed with much favor; they were thought to be applicable, at the most, in only a few exceptional cases, and this opinion will probably be shared by most of those who have had such experience as comes with a few years of hospital practice. After fracture of the shaft of a long bone, faulty union is habitually the result not of defective immobilization, but of a failure to properly reduce the displacement in the first instance. If complete reduction can be and is made, the ordinary retentive dressings in common use are ample to insure a good result, and by that is meant not a complete *restitutio ad integrum*, but a union with only so little displacement that the appearance and functions of the limb are not noticeably affected thereby.

Fracture of the Neck of the Radius.—Jayle⁷ reported a case of this rare injury in combination with fracture of the olecranon, apparently by direct violence from the passage across the elbow of the wheel of a wagon. The noteworthy feature is that the head shared in rotatory movements communicated to the shaft. The diagnosis was made only at the autopsy.

Colles's Fracture; Faulty Union; Correction.—F. T. Paul¹⁸⁷ reports a case of operative correction of the displacement of an unreduced Colles's fracture of nine weeks' duration. The incision was made "over the back of the lower end of the radius, parallel

with the extensors of the thumb"; the lower fragment was freed with a chisel and forced into place. Successful.

Treatment of Fractures of the Leg and Thigh without Confinement to Bed.—Korsch⁴, returns to this subject to state that further experience has confirmed his opinion that recovery takes place after fracture of the leg more promptly, and with less wasting of the limb and stiffness of the joints, if the patients are not confined to bed, and to say that he has extended the method also to fractures of the thigh and compound fractures of the leg. In the latter the patient is kept in bed for from two to seven days, according to the severity of the wound, and then a plaster dressing is applied. The wound is thickly covered with iodoform gauze, which is renewed from time to time as needed.

In fractures of the thigh the first week is spent in bed with the hip abducted and flexed, and extension by a weight of twenty-five pounds. The limb is then lightly incased in plaster from the toes to a hand's breadth below the perineum, and a well-padded pelvic ring with two long side-bars of metal, similar to the splint used in cases of hip-joint disease, is passed over the limb and pressed well up against the ischium; the side-bars are bent at right angle below the sole to take the weight of the body in walking, and they are incorporated in the plaster dressing by rolling other plaster bandages over them. He insists upon the importance of placing the plaster directly upon the (greased) skin without the interposition of cotton. He admits the possibility of causing sloughs by undue pressure.

Fracture of the Leg Complicated by Injury of the Main Artery.—A. Pearce Gould⁵, reports a case of compound fracture of the leg, by direct violence, in a man 52 years old, in which arterial bleeding occurred on the thirteenth day. He enlarged the wound, found the anterior tibial artery divided, and tied both ends. The patient made a good recovery.

Fracture of the Neck of the Femur.—Willy Meyer⁶, reported to the New York Surgical Society a case of old ununited fracture at the junction of the head and neck of the femur, in a man 39 years old, treated by opening the joint, freshening the surfaces of the fracture, and pinning the fragments together by means of two long, steel pins. Before the operation the limb was three and one-fourth inches shorter than the other, and the patient was unable

to bear his weight upon it. He was kept in bed for ten weeks. When he was presented before the society he was able to walk with the aid of a cane, and the shortening was one and one-half inches. Meyer thought that bony union had taken place, but some of the members of the society doubted it. The report does not state whether or not the pins were left in place.

Humerus Fracture Complicated by Coincident or Subsequent Injury to the Nerves.—Several cases of musculo-spinal paralysis are reported by Deanesly,² and one by Thornton.⁶ The former reports, also, one case of paralysis of the median and ulnar nerves, and two of fracture of the forearm, one of which was complicated by paralysis of the median, the other by that of the posterior interosseous.

Clavicle.—A case of simultaneous fracture of both clavicles is reported by Ira J. Dunn.¹¹² The patient was an adult male, and the injury was caused by the fall of rock in a mine; the fractures were "at the acromial ends." Extensive emphysema; great dyspnoea. Good recovery.

DISLOCATIONS.

Dislocation of the Shoulder.—Delbert⁸⁰⁰ reports an unsuccessful attempt to reduce an old dislocation by the method of approach through a posterior incision, and studies the subject in detail on the basis of one hundred and ten cases of old unreduced dislocations collected by him from museums and reports of autopsies and operations. His bibliography, however, fails to include some valuable cases that have been quoted in the ANNUAL. The only American cases quoted, two in number, date from 1869 and 1877. In his conclusions he wholly rejects the posterior approach and accepts the usual anterior one. While the article adds little or nothing that is new to our knowledge of the subject, it is a convenient, though incomplete, summary of the literature of the pathology of the condition.

Elbow.—Helferich⁶⁹ reports two cases of recent irreducible dislocation of the elbow backward, which he successfully treated by arthrotomy, making a longitudinal incision along the inner side in each case, and a second incision on the outer side in the first case. The patients were 10 and 13 years old, respectively; the character of the obstacle to reduction is not made clear.

Hip.—Helferich⁶⁰ reports, also, a successful reduction of a dorsal dislocation of the hip by arthrotomy in a patient 4 years old. The incision was made in front, running directly down the limb, between the sartorius and tensor vaginæ femoris, from a point one finger's breadth external to the anterior superior spine of the ilium. Recovery complete.

Hip, Upward Dislocation.—Stimson⁹⁸ reports a case of this rare injury. The attitude was complete extension of hip and knee, slight abduction, and very marked outward rotation. The head of the femur lay directly beneath the skin, "just external to a line drawn downward from the anterior superior spinous process, and its upper border was about one inch below that prominence." Reduction was easily effected under ether, by moderate traction upon the slightly-flexed thigh and direct pressure upon the head of the bone. Recovery.

Patella.—Four cases of edgewise or vertical dislocation of the patella are reported: Herflosen,⁹⁸ Ewing,¹⁰⁴ Suiter,⁶⁰³ and Huntley.²⁸⁹ The first three were outward; the variety of the fourth is not mentioned. All were easily reduced by extension of the knee, flexion of the hip, and direct pressure on the patella.

Knee.—McKenzie⁸⁹ reports a case of the very rare injury,—complete outward dislocation of the knee; it was caused by a violent blow upon the leg. Reduction was easily effected without incident. At the time of the report the patient was slightly lame; the knee could be freely extended and flexed to a right angle.

Semilunar Cartilages of the Knee.—Four cases are reported of operations to relieve dislocation of one of the cartilages,⁷⁶¹ forty-three other cases being collated. The internal cartilage was the one affected in two-thirds of the cases, the anterior portion alone being usually displaced.

Astragalus.—Seiler²¹⁴ reports a case of dislocation inward with 90-degree rotation, and with fracture of the internal malleolus and sustentaculum tali, successfully treated by operation.

Recurrent Dislocation of the Shoulder.—Ricard¹⁴ reported two cases successfully treated by a new method of his own. An incision twelve centimetres long is made from the clavicle downward in the interval between the deltoid and pectoralis major, and a second carried outward from the upper end of the first along the clavicle and acromion. The deltoid is detached throughout the

whole extent of the incision and turned outward, and the coracobrachialis forcibly raised so as to expose the tendon of the subscapularis; the arm is then rotated inward as far as possible, and in the anterior portion of the capsule thus released, and "in the thickness of the subscapularis," three sutures of stout, flat silk are placed vertically two centimetres apart and then tied. This changes the "anterior portion of the capsule into a thick, resistant, rigid mass." The deltoid is then brought back into place and the wound closed. In one of the two cases nine months had elapsed since the operation without a recurrence; in the second three months had passed without recurrence, although the patient had had many epileptic convulsions, and previous to the operation had always dislocated the shoulder at such times.

Old Unreduced Dislocation of the Shoulder.—MacCormac¹⁴ reported to the French Surgical Congress a case in which suppuration of the wound followed reduction by operation, and led to resection of the head of the humerus. In a second case he proceeded at once to resection of the head. In the discussion Severeanu reported one successful case, and Pollossen six, of reduction by operation. MacCormac advises that in recent dislocation with fracture of the humerus, which prevents reduction, immediate resection of the head should be done. A recent experience of McBurney, of New York (oral communication), shows that we should not too readily admit that the dislocation is irreducible. In a case of two weeks' duration, in which three other surgeons had failed to reduce, he succeeded by forcing the point of a stout, rectangular, steel hook into the upper fragment, and effecting the necessary traction and rotation thereby.

Elbow.—J. S. Wight¹⁸⁵ reports an almost unique case of divergent dislocation, the radius outward, the ulna inward. The patient was a woman 30 years old, and the injury was caused by a fall while walking. Supposing it to be an ordinary backward dislocation, he made two unsuccessful attempts to reduce, one under ether; further examination then showed the character of the displacement, and reduction was effected by first getting the radius into place by traction, adduction, and direct pressure, and then the ulna by traction, adduction (*sic*), and flexion. Severe pain followed reduction, and great swelling.

INJURIES AND DISEASES OF ARTERIES AND VEINS.

By CHRISTIAN FENGER, M.D.,
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INJURIES TO ARTERIES.

Subclavian.—Rotter ⁸⁴_{Dec. 6, 1882} reports a case of punctured wound of the subclavian artery and vein above the clavicle, from which a severe haemorrhage ensued on the ninth day. Resection of the clavicle was necessary to gain access to a cavity, the size of a pigeon's egg, in which a wound in both vessels was found. The artery and vein were ligated above and below, and the patient recovered. The author found, in the literature of this century, only twelve cases of this lesion. Of the 13 cases now on record, 7 had secondary haemorrhage, of which only 1 recovered; 6 had no secondary haemorrhage and all recovered.

External Iliac.—Cartledge ⁶²⁸_{Feb. 9} reports a case in which an abscess in the iliac fossa, subsequent to resection of the hip-joint, caused a perforation into the external iliac artery. Three days after incision of the abscess profuse arterial haemorrhage occurred, and upon laying open the abscess-cavity an opening into the artery as large as a pea was seen. The artery was ligated above and below, and the patient recovered.

Femoral.—Dickson ²⁰⁷_{Jan.} reports a case of punctured wound of the femoral artery in which a single ligature above the wound was followed by recovery, notwithstanding suppuration of the wound. Another patient, a boy about 10 years old, received a gunshot wound in the groin, below Poupart's ligament. The ball passed through the pelvis and out through the buttocks near the anus. The profuse haemorrhage was checked by a compress and did not return, but a small traumatic aneurism developed with distinct thrill and bruit. This aneurism gradually diminished in size and finally disappeared, and the boy was well two years later.

Wiesmann ²¹⁴_{Nov. 1882} reports the following case of wound of the femoral artery: In stepping over a fence covered by snow a picket

penetrated the inner side of the patient's thigh. The injury was immediately followed by enormous haemorrhage, which was temporarily controlled by an elastic bandage around the thigh. Fifteen hours later the artery was ligated above the wound, in Scarpa's triangle, as the author deemed it inadvisable to search for the wound in the artery (which would have required extensive dissection), on account of the exsanguinated condition of the patient. The original wound suppurred and did not heal for six weeks. Paralysis of the leg and foot with considerable atrophy followed, which were attributed to the long-continued application of the elastic bandage.

Arterial Wounds of the Hand.—Chalmet²², recommends, in wounds of the deep palmar arch,—where a direct ligature will necessitate division of nerves and opening of the sheaths of tendons,—instead of distal ligature, plugging the wound, flexion of the forearm on the arm, and a moderate compression of the radial and ulnar arteries by pads of lint retained in place by a bandage, and immobilization of the arm by a sling, as employed in fracture of the clavicle. He has used this method successfully in two cases.

LIGATURE METHODS.

The trans-peritoneal ligation of the iliac arteries, advocated by Dennis in 1886, for the internal iliac, in preference to the extra-peritoneal operation, has been resorted to for the external iliac by Banks.²³ A farm-laborer had an aneurism, the size of the fist, located in Scarpa's triangle, and extending upward beneath Poupart's ligament. An incision was made three inches in length along the right linea semilunaris, the cæcum and small intestine pushed aside, and ready access had to the external iliac artery. Its peritoneal covering was incised for three-fourths of an inch, and the apparently healthy artery ligated with catgut. The peritoneal incision was closed with catgut sutures, and the abdominal wound united without drainage. On the eleventh day symptoms of pulmonary embolism appeared, but quickly subsided. The patient left the hospital, recovered, forty-two days after the operation. The author has tied the external iliac twice by the extra-peritoneal method, and considers it to be the operation of choice under ordinary circumstances. He is of the opinion that this operation, which is safe and simple, should be performed in all

cases where the aneurism is low down, and in which the artery above the aneurism is probably healthy. But where the aneurism is high, and there is doubt as to the soundness of the artery near it, the intra-peritoneal operation is preferable.

Makins⁶ Dec. 10, '93 reports the following interesting case of successive trans-peritoneal ligature of the external iliac artery on both sides for iliac aneurism. The patient, a man of 30 years, had an aneurism in the left groin, two inches in breadth, which extended upward toward the umbilicus, four inches from a point two inches below Poupart's ligament. The author made an incision in the left linea semilunaris; ligated the deep epigastric artery, which originated in the tumor; pushed the sigmoid flexure upward; made an incision in the peritoneum, in the lower portion of its mesentery, at the lower margin of the pelvis; isolated the external iliac artery, and passed a ligature around it three-fourths of an inch below the bifurcation of the common iliac and one and one-half inches above the aneurismal sac. Two threads of stout, flossy, sterilized silk were tied separately, but in close approximation, with sufficient firmness to rupture the internal and middle coats of the artery. The posterior peritoneum was sutured over the artery. Peripheral circulation in the limb returned quickly, and the patient left the hospital in forty-seven days. The aneurism gradually disappeared. Seven and a half months later the author operated upon the same patient for aneurism on the right side, one and one-half inches in diameter, above Poupart's ligament, through an incision in the right linea semilunaris, in a similar manner and with as good results as in the former operation. In his remarks Makins points out that the operation on the right side was much more easy than that on the left in this case, because the crossing of the ileum was on a much higher level on the right side than the crossing of the sigmoid meso-colon on the left side. The artery on the right side was also much more prominent on the brim of the pelvis. The collateral circulation after the second operation was established much more rapidly than after the first, probably because the right deep epigastric artery was not ligated. The reason for the selection of the trans-peritoneal method in this operation was the high position of the aneurism, as it was possible that it might prove necessary to ligate the common iliac. However, the experience gained by the operation shows that the extra-peritoneal method might have been safely

adopted. The author concludes that in ordinary cases there is little difference in difficulty between the two operations, and that the extra-peritoneal method is preferable as far as resulting ventral hernia is concerned. On the other hand, where the common iliac artery is to be ligated, the trans-peritoneal method is preferable, as it is probably the easiest of all operations upon the great arteries.

Brown,⁶ reports a case of double aneurism of the right leg in a woman aged 48. The upper aneurism was situated in the groin, the size of a cocoa-nut, extended above Poupart's ligament, and was on the verge of bursting. A second aneurism was found lower down, in the middle third of the femoral artery. The position of the upper aneurism prevented any of the usual operations being performed, and trans-peritoneal ligation was decided upon. A median incision, six inches long, through a fat abdominal wall, led down to a voluminous omentum, which embarrassed manipulation. In Trendelenburg's position the contents of the pelvis were pushed upward and a ligature passed around the external iliac. The abdominal wound did well, but gangrene of the leg necessitated amputation, and the patient died two and a half months later. The author points out that trans-peritoneal ligation of the external iliac artery, which is described by other operators as a very easy operation, was in this case exceedingly difficult. The wound was deep, the artery was crossed by three or four large veins, and isolation of the vessel, and passing the ligature around it was far from easy. The extra-peritoneal method, however, might have been in this case still more difficult, and the author thinks that the trans-peritoneal method is the one to be generally adopted.

Clement Lucas,² briefly mentions a case of rapidly-increasing aneurism of the common iliac, on which he operated by the trans-peritoneal method in 1889. The patient recovered rapidly, with no disturbing symptoms. This was probably the first performance of this operation. It was mentioned in the medical journals of 1889, but has never been published in detail. The author believes that the trans-peritoneal method for ligation of the common and internal iliac arteries is decidedly preferable to the extra-peritoneal method, with its "ghastly incision" through the parietes and the laborious stripping up of the peritoneum. But, for ligation of the external iliac, the author considers that the

extra-peritoneal operation is ordinarily a neat and effective operation, within the range of a surgeon of average skill.

Wherry⁶ publishes a case of successful intra-peritoneal ligation of the internal iliac artery for pulsating tumor, possibly a sarcoma in the gluteal region.

External Carotid Artery.—As a means of preventive haemostasis during operations in the territory of the external carotid Guermonprez²²⁰ recommends direct, temporary, elastic compression of the artery as a new method to replace that of ligature of the artery. In case of a large tumor of the superior maxilla, soft palate, and cheek, he succeeded in extirpating the tumor, with the patient in Rose's position, with so little haemorrhage that only two artery-forceps had to be applied. To effect this the external carotid was tied in the following manner: After extirpating a group of infected lymph-glands in the region of the bifurcation of the carotid, he opened the sheath of the vessels just behind the great cornu of the hyoid bone. The trunk of the common facial vein was pushed downward, below the digastric muscle and hypoglossal nerve, an aneurism-needle passed around the external carotid artery, and a silk thread, to which a small drainage-tube was tied, passed around the external carotid artery. The drainage-tube being in position around the artery, it was found that slight traction on the elastic tube was sufficient to stop the circulation in the artery, and the elastic compression of the vessel was maintained by means of a small haemostatic forceps, which compressed the tube not upon, but close to the wall of, the artery. The pressure of the drainage-tube on the artery was distributed over a space of four or five millimetres, and thus acted similar to digital compression, and avoided local injury to the walls of the vessel. The haemostasis during the operation was very effective, and, when the compression was removed, circulation was immediately re-established, as could be felt by return of pulsation in the temporal artery; in the extensive wound of operation no haemorrhage occurred, and not a single ligature had subsequently to be applied. The author points out that his method is more conservative, as it does not destroy the circulation in the territory of the affected artery, and is preferable to either ligature or temporal compression with haemostatic forceps, by which the wall of the vessel is necessarily crushed.

The prognosis of ligature of the external carotid artery has been studied by Lipps,¹⁸ who collected 130 ligations of the external carotid in 118 patients. The indications were as follow: For the cure of angioma, 18; preliminary to extirpation of angioma, 25; during extirpation of tumors, 26; arrest of haemorrhage, 28; cure of facial neuralgia, 3; arrest of growth of malignant tumors, 3; unknown causes, 2; 12 cases of ligature on both sides, and 13 cases of Küster's, hitherto unpublished. Thirty-two patients died; but only in two instances was death caused by ligature,—from thrombosis which extended from the external carotid down into the internal carotid artery. The statistics prove that ligature of the external carotid should always be given the preference, when practicable, over ligature of the internal carotid. The literature showed that ligature of the external carotid was not followed by disturbances of brain circulation; while, after ligature of the internal carotid, 13 to 18 per cent. of the patients succumbed from this cause. In twelve cases in which both external carotids were ligated no untoward symptoms ensued.

ARTERIAL ANEURISMS.

Diagnosis.—As a means of diagnosing obscure aneurisms of the aorta, Fenwick and Overend,² have constructed an apparatus by which the pulsations of the aneurism can be traced; it consists of a tube, passed into the oesophagus, so arranged that the pulsations can be transmitted and recorded on a revolving drum. Sometimes the bruit can also be heard. In one case, however, the straining and retching caused by the presence of the tube in the oesophagus brought on an immediate and alarming attack of haemorrhage, which caused the authors to consider the method as dangerous and to abandon it.

Multiple Aneurisms.—Mackellar¹¹² reports a case of a man of 30 who had the right femoral artery ligated for popliteal aneurism in 1888. Five months later the left femoral was ligated, also for popliteal aneurism. Four years afterward the right common carotid and subclavian arteries were ligated for aneurism of the innominate artery, in which rupture took place three months later.

Ensor,⁶ ligated the external iliac artery for an aneurism of the femoral artery in the groin the size of a large egg, and another in the popliteal space the size of a cocoanut, with recovery.

Williams² reports a case of ligature of the right femoral artery for large popliteal aneurism which he performed in 1891. Two years later an aneurism formed in Scarpa's triangle immediately above the former ligature, on account of which the external iliac was successfully ligated. At the same time the patient had a left popliteal aneurism for which he declined operation.

Finley²⁸² showed the specimens from a case of multiple aneurism before the Montreal Medico-Chirurgical Society. An aneurism of the superior mesenteric artery ruptured and caused death. The autopsy revealed a small sacculated aneurism of the abdominal aorta, a dissecting aneurism of the descending thoracic aorta, and a fourth aneurism, an inch in diameter, on the anterior wall of the subclavian artery.

McDonald⁵⁵⁷ reports the case of a man of 30 with left popliteal aneurism, an aneurism of the abdominal aorta, and a large aneurism of the thoracic aorta. The femoral artery was ligated successfully for popliteal aneurism. At the death of the patient from heart-failure, caused by the thoracic aneurism, a fourth aneurism was found in the right popliteal space.

Hulke⁴⁵¹ reports a case of a man of 73 who had aneurism of the right popliteal artery, the right femoral artery, double aneurism of the left popliteal artery, aneurism of the left femoral artery, and slight bulging in the right external iliac. He also reports the case of a man who had an aneurism in both popliteal, both femoral, and both external iliac arteries, and also an aneurism of the aorta.

Paul¹⁸⁷ reports a case of successive aneurism of both popliteal arteries. Ligation of the femoral cured the aneurism on the left side, but on the right side pulsation recurred after a time. Simultaneously an aortic aneurism developed.

Cirsoid Aneurism.—Kötschau¹¹² reports a case of large cirsoid aneurism which developed subsequently to injury received thirty-three years before, and which gradually extended from the temporal region until it invaded the entire side of the head. Dilatation of the arteries extended to the eye, which was blind, and down the neck into the supra- and infra-clavicular fossæ. The patient insisted upon operation, contrary to the advice of the author. The large tumor, twenty-one centimetres in diameter, in the temporal region, was surrounded by percutaneous ligatures and

extirpated ; during the operation manual compression of the afferent arteries was made. Fourteen days later severe haemorrhage occurred from a portion of the tumor that was left, for which extirpation was necessary. During the operation collapse occurred, for which transfusion was made, and the patient recovered. The dilated arteries over the eye and in the neck retracted spontaneously. Complete recovery followed.

Brousses²¹¹, July 20, reports a case of cirsoid aneurism over the right wrist-joint, which developed gradually after a traumatism.

Nancrede,⁹⁶ after considering the surgery of cervical, thoracic, and abdominal aneurisms, submitted the following propositions:—

Cervical Aneurism.—1. All methods should be supplemented by recumbency and diet.

2. Proximal compression, when feasible, should always be tried, and, where the arterial coats are seriously diseased, should supersede ligation.

3. Needling should supplement pressure when the case is progressing rapidly. Possibly it is advisable in all cases suitable for compression, and is certainly to be employed where this method fails in cases with highly atheromatous vessels.

4. Proximal ligation, having been rendered much safer of late by the use of aseptic precautions, less-absorbent ligatures, and the avoidance of all injury to the arterial walls by employing the stay-knot, is permissible when the arterial walls are relatively sound, until experience decides whether or not needling is clearly indicated.

5. Since recurrence after proximal ligation almost certainly results from non-deposition of white thrombi and their maintenance in contact with the aneurismal wall from lack of proper changes of its lining, needling is clearly indicated.

6. Where the location prevents proximal arrest of the blood-current, needling is the best operation ; possibly distal compression —rarely feasible—might aid in the deposition of thrombi.

7. For the reasons already given, although occasionally successful, the indications for the permanent introduction of such foreign bodies as wire, horsehair, etc., into aneurismal sacs are so much better met by needling that such procedures had better not be adopted.

8. The modern revival of the older method of extirpation of

aneurisms should not be attempted for spontaneous cervical aneurisms.

Thoracic Aneurism.—1. All methods should be aided by the employment of rest in bed and proper diet.

2. The permanent introduction of foreign substances should not be employed.

3. Needling should be tried, aided by distal compression when feasible during the use of the needles; if this fail, distal ligation should be resorted to.

4. Distal interruption of the blood-current by simultaneous ligation of the carotid and subclavian arteries may be tried.

5. Needling is indicated when complete or partial failure follows distal ligation.

Abdominal Aneurism.—1. All methods should include recumbency and diet.

2. Needling, when this can be done without injury to the hollow viscera, is the most promising plan.

3. Proximal or distal compression may be tried with or without needling, but to be effectual must be done under anaesthetics.

4. The permanent introduction of foreign bodies into the sac is inadvisable.

Hulke,⁴⁵¹ in a clinical lecture at the Middlesex Hospital, recommends Tufnell's treatment of restricted diet and rest in bed for aortic aneurisms. For aneurisms of the lower extremities he has devised a simple weight-compressor, consisting of a frame-work to be attached to the bed. He urges gentle handling of cervical aneurisms to avoid the dislodgment of coagula through the internal carotid, and referred to a case reported by Ferguson in which manipulation during the examination of an aneurism was followed by immediate paralysis.

Williams⁸¹⁴ recommends the trial of compression by means of the contractile power of ordinary collodion, in small aneurisms, and reports a case of traumatic aneurism of the temporal artery, the size of a small hickory-nut, which was cured in a few weeks by this method. He also states that the method was equally successful in two other cases, the details of which he does not give.

Turner⁸¹ proposes to treat aneurisms by the injection of coagulated blood by means of the hypodermic needle. He has not, however, applied the treatment in any cases as yet.

Thoracic Aorta.—Jelks,²⁰² July 10, reports an aneurism of the arch of the aorta in which introduction of silver wire was tried with no effect. Similar cases, with similar results, are reported by Stewart,²¹ and Baccelli.⁷³ Pitt,² April 8, recommends frequently-repeated venesections to relieve acute symptoms. He has employed this treatment in nine cases.

Innominate Artery.—Le Dentu,¹⁰ June 21, has employed peripheral ligature in two cases of aneurism of this artery. In the first case the right common carotid and subclavian were ligated simultaneously with no effect on the aneurism. In the second case—a woman of 37 years, who had an aneurism the size of a fist—the author ligated the right common carotid and subclavian, with the result that the severe pain in the right side of the neck, face, and arm, the pain in the chest, and dyspnœa disappeared rapidly. The pain in the left side and arm, however, increased. A week after the operation the pulsations in the tumor were greatly lessened. This improved condition lasted about three months, when the pain returned. As the author supposed this to be due to extension of the aneurism in the course of the aorta, he ligated the left subclavian artery in its outer third. The dyspnœa and pain disappeared immediately, and patient was able to mount stairs and resume her occupation as seamstress for five months, when the symptoms reappeared and she died from slow asphyxia. The autopsy showed mixed aneurism of the innominate artery and the aorta, and further revealed that not the left subclavian artery, but one of its large branches, had been ligated. The author refers to 126 cases of peripheral ligature for the cure of aneurisms of the innominate artery and aorta collected by Winslow, which included 96 cases of innominate aneurism. The analysis of these cases leads the author to conclude that it is preferable to perform simultaneous ligature of the right common carotid and right subclavian in these cases, as in one-third of the cases reported a decided improvement took place, and as in 3 cases verified by autopsies, the patients having died two or three years after the operation from other diseases, complete cure was effected.

The author makes the following conclusions:—

1. Aneurisms of the innominate artery: Commence with simultaneous ligation of the right common carotid and subclavian. If the tumor continue to develop to the right of the sternum, ligate

the right vertebral artery. If the tumor develop to the left of the sternum, ligate, some time later, the left subclavian artery. The left common carotid should not be ligated until some months after the ligature of the right common carotid.

2. Primary or secondary aneurisms of the aorta: (a) Ascending aorta. Ligate the right common carotid and subclavian. (b) Horizontal portion of the arch. One of the large vessels on each side may be ligated at one sitting, providing that both common carotids are not ligated on the same day. (c) Aneurisms to the left of the left subclavian. No ligation of any vessel should be practiced, as the operation would only increase the tension in the sac. (d) If there is a simultaneous aneurismal distension of the arch of the aorta and of the innominate artery, peripheral ligatures may still be of advantage, in temporary arrest of progress of the disease and in alleviation of symptoms, as demonstrated in the second case reported by the author.

Marriott,^{2, 18} reports a case of innominate aneurism, treated by simultaneous ligature of the right subclavian and right common carotid arteries, in which no effect was noticed for five months, when the tumor began to diminish in size and to become harder, and the patient resumed his heavy work as a laborer at a coal-wharf, and two years later he was in perfect health.

Common Carotid.—Fayrer,^{2, 19} reports an aneurism of the right common carotid in the middle of the neck, in a boy of 18 years, which caused pain, dyspnœa, and partial loss of voice. Double-silk ligature was passed around the artery, which was then divided on the proximal side of the aneurism. Suppuration of sac followed with secondary haemorrhage on the twenty-fourth day; patient recovered. A case is reported in Middlesex Hospital,^{6, 10} in which the common carotid formed an horizontal loop simulating an aneurism.

Subclavian Artery.—Coppinger,⁶ reports a most remarkable case of subclavian aneurism cured by simultaneous ligature of the innominate and right common carotid arteries. A man, aged 53, had an aneurism of the right subclavian artery the size of a hen's egg. The axillary artery was dilated to the size of a walnut. As the patient refused disarticulation of the arm, and distal ligature of the axillary artery being inadvisable on account of the aneurism, the author ligated the two above-named arteries as follows: Ver-

tical incision was made over the carotid and transverse incision over the inner part of the clavicle. The internal jugular vein was then ligated and the sternal origin of the sterno-mastoid divided. A ligature was passed around the carotid and the sterno-hyoid and sterno-thyroid muscles divided. The innominate artery was now ligated. A double-silk ligature was then passed around the carotid artery and the artery divided between the ligatures. The operation was followed by primary union of the wound, disappearance of the aneurism, and the patient was left with a useful arm. In an editorial comment upon Coppinger's case it is stated²² that ligature of the innominate artery alone has been made fifteen times, always with fatal result. Simultaneous ligation of the innominate and carotid has been done seven times, with five deaths and two recoveries. In the first successful case, that of Smith, of New Orleans, the operation was followed by a succession of secondary haemorrhages, which were finally controlled by ligation of the vertebral artery. Coppinger's is the only case on record of recovery without secondary haemorrhage. Thorne²³ reports a case of right subclavian aneurism extending into the axillary artery, in which an attempt was made to ligate the subclavian artery above the aneurism, but on account of the dilation of the artery it was abandoned. Suppuration followed and the aneurism disappeared.

Vertebral Artery.—Magruder²⁴ reports a case of traumatic aneurism from a pistol-shot wound in the upper part of the neck, injuring the left vertebral artery. Four weeks after the injury the aneurismal cavity was opened and the clot turned out. Immediate, severe arterial haemorrhage followed, which was controlled by packing with bichloride gauze left *in situ* four weeks, and the walls of the cavity sutured; recovery ensued.

Brachial Artery.—White and Wood²⁵ report a case of a man of 53 years, who had received a revolver-bullet wound of the brachial artery eleven years previous. The haemorrhage was then checked by packing. An aneurism finally formed and ruptured into the tissues of the arm, and the radical operation was followed by perfect recovery.

Radial Artery.—Maylard²⁶ reports a case of traumatic aneurism of the radial artery near the elbow, in a boy of 14 years. The sac, an inch long and one-half inch broad, was extirpated; recovery.

Gluteal Artery.—Miller,² treated a case of large left gluteal aneurism in a man of 75 years, by Macewen's needles. Sixteen pins were introduced into the sac and left in for half an hour. This procedure was repeated twelve days later, but only four pins were employed. The aneurism decreased in size, and pulsation ceased. The patient died from abdominal sarcoma two and one-half months later, and, on autopsy, the aneurismal sac was found to be filled with a firm, solid clot.

External Iliac Artery.—Bryant,⁹⁶ reports a case of large aneurism of the right external iliac artery in a man of 35, which was treated by Macewen's needles in the following manner: After half an hour's teasing of the lining of the tumor at different points, two of the needles were left in to remain twenty-four hours. Six days later the needles were re-introduced and left in for forty-eight hours. In three weeks the pain and pulsation had stopped. Later on a slight return of pulsation was noticed.

Clutton² reports a case of traumatic aneurism of the external iliac from a punctured wound. Twenty-five days after the injury the aneurism was exposed and the artery ligated above and below; recovery.

Femoral Artery.—Menocal⁷³ reports a case of femoral aneurism cured by ligation of the external iliac, and two days later extirpation of the aneurismal sac.

Molloy¹⁹ reports a case of aneurism in Scarpa's triangle in which instrumental compression above the aneurism was employed for eighteen days, but had to be abandoned on account of the irritation of the skin which it caused. The aneurism gradually diminished in size and recovery followed.

Popliteal Artery.—Terrier and Hartman⁶ report a case of diffuse popliteal aneurism in a boy of 17, caused by an exostosis due to ossification of the tendon of the adductor magnus muscle. A large pulsating tumor occupied the lower part of the thigh, the knee, and the upper part of the leg. The popliteal space was incised, a large quantity of clots turned out, and a longitudinal opening in the popliteal artery found close to the pointed exostosis. The injured portion of the artery was excised, and ligatures applied above and below. The patient recovered with full use of the limb. The author mentions a similar case of this rare affection reported by Boling,²⁰⁷ in which rupture of the artery was caused by two epi-

physeal exostoses. The leg was amputated at the thigh and the patient recovered.

Wright²²¹ reports two cases, under Langton's care, of aneurism in each hand, both cured by intermittent pressure in twelve and sixteen hours, respectively. In the second case, as pressure failed, the superficial femoral was tied, but as the sac gave way and a clot presented the popliteal was ligated above and below, and cure resulted.

Schmidt²²² reports a case of bilateral popliteal aneurism in which he extirpated the sacs in 2 operations with complete success. He has collected from the literature 10 cases of this affection, with 9 recoveries and 1 death from sepsis, but in which small superficial patches of skin in the sole of the foot sloughed off, fifteen centimetres of the artery having been removed. He recommends the radical operations for popliteal aneurisms as preferable to all other methods.

Cowell¹⁰⁷⁷ reports a case of popliteal aneurism in a man of 40, cured by the Antyllean method.

Martin²²³ reports a case in which Shepherd ligated the femoral artery in Scarpa's triangle. Gangrene of the toes followed, and the leg was amputated; recovery.

Miller²²⁴ ligated the femoral below Scarpa's triangle for popliteal aneurism, with recovery.

Harrison²²⁵ reports a case of punctured wound of the popliteal artery followed by aneurism. Compression was tried without success, and the operation of Antyllus was performed, followed by gangrene. Amputation above the knee was performed, and recovery ensued.

White and Wood⁵ report three cases of popliteal aneurism. The first was a man of 25, with advanced mitral heart disease, and a right popliteal aneurism which was cured by ligation of the femoral artery in Scarpa's triangle, after digital compression and Esmarch's bandage had been tried in vain. The other two patients, men of 32 and 33 respectively, were cured without ligature in the following manner: The limb was flexed and elevated on a pillow, iodide of potassium given internally, and digital compression of the femoral continued for fifty-four hours. This was followed by moderate pressure with a horseshoe tourniquet for ten hours, after which a bandage was placed in the bend of the knee, and the

limb flexed, bandaged, and retained in a flexed position. Both cases were cured in a month.

Dorsalis Pedis.—Finney⁷⁶⁴ reports a case of aneurism, the size of an egg, on the dorsum of the foot, subsequent to subcutaneous traumatism. The sac was extirpated, and prompt and satisfactory recovery followed.

ARTERIO-VENOUS ANEURISMS.

Axillary Artery.—Osler⁹⁶ reports a case of arterio-venous aneurism of the left axillary artery and vein of fourteen years' standing, caused by a punctured wound of the axilla. The arm appeared normal; the veins were not distended; the function was perfect, but all over the arm the characteristic bruit could be heard; operation contra-indicated.

Arm and Hand.—Wiedemann⁷⁸¹ reports a case of spontaneous, probably congenital, arterio-venous aneurism of the arm and hand, caused by an abnormal communication between the common interosseous artery and a deep branch of the cephalic vein. There was considerable thickening of the left arm, pulsation and bruit in the dilated veins, a chronic ulcer on the ulnar side of the arm, flexion contracture of the third and fifth fingers, œdema of the hand, and violent pain. Ligature of the brachial artery was followed by gangrene of the forearm and hand, which necessitated amputation in the middle of the humerus; recovery.

Poncet¹⁰⁰ reports a case of traumatic arterio-venous aneurism of the radial artery and vein in the middle of the forearm following a punctured wound. Eight days after the injury a thrill was heard from the elbow to the wrist. At the excision of the wounded part of the artery and vein, a small, pointed piece of steel was found; recovery.

Femoral Artery.—White and Wood⁵ report a case of a man of 29 who had a large pulsating tumor below Poupart's ligament, the result of an old gunshot wound. Ligature of the iliac was proposed, but refused. Pressure by means of shot-bags for four weeks was followed by rupture of the aneurism, with enormous extravasation into the surrounding tissues. The leg was amputated below the trochanter; death. The autopsy showed that the external iliac vein and artery were enormously dilated, the vein as large as the small intestine, the artery three times its

normal calibre. The walls were exceedingly thin, and the vein ruptured above the level of Poupart's ligament. The communication opening between the vessels was of the size of a lead-pencil.

Lannelongue¹⁸⁸ reports a case of a man of 25 who had a punctured knife wound two inches below Poupart's ligament. The wound healed in a week. Three weeks later an arterio-venous aneurism developed. About three months after the injury the femoral artery and vein were ligated above and below the knee, and the sac extirpated. The operation was followed by complete recovery. The surface temperature was increased 1.4° C. (2.5° F.) on the affected side prior to operation.

Posterior Tibial Artery.—Annequin²⁴³ reports a case of arterio-venous aneurism of the posterior tibial artery due to a shot-gun wound through the calf of the right leg. The wound healed in eight weeks. A week later an arterio-venous aneurism developed fourteen centimetres above the internal malleolus. The swelling of the leg, enlargement of the veins, and pain rendered operation imperative. Incision as for ligation of the posterior tibial artery revealed a tumor eight centimetres long and four centimetres broad, consisting of dilated vessels. Isolation of the tumor from the posterior tibial nerve was difficult. Ligatures were placed above and below the tumor and the tumor extirpated. The posterior tibial artery was found to communicate with one of the veins by an opening four millimetres in diameter. Complete local and functional recovery followed in three months. The author has collected all the cases of this affection from the literature, 8 besides his own, of which 4 were caused by shot-gun injury, 2 by punctured wounds, 1 by pistol-bullet wound, and in 1 case the aneurism developed in the stump of a tibio-tarsal disarticulation. As to the prognosis: Only 1 patient died, in whose case ligation of the femoral artery was followed by gangrene. Functional disturbances of the extremity, pain, ulcers, etc., are, however, often grave, and in only 1 case was reasonable use of the limb restored by the use of an elastic stocking. The treatment employed was the radical operation in 4 cases, with 4 recoveries; distant ligature was successful in 1 case, in which the posterior tibial artery and veins and the peroneal artery and veins were ligated four centimetres above the aneurism. In 1 case ligation of the femoral artery was followed by death, and 1 case distant ligature above

and below the aneurism was followed by relapse. Compression and galvano-puncture were always unsuccessful. In the radical operation the author considers it important to carefully isolate the posterior tibial nerve.

INJURIES OF VEINS.

Subclavian Vein.—Herbing³³⁸ reports a case of punctured wound of the right subclavian vein in the subclavicular fossa immediately followed by severe haemorrhage, which was stopped by packing. When the extremely anæmic patient was brought to the hospital and the packing removed, the haemorrhage recurred. The author treated this by pressure from below, dilated the wound, and made preparations to divide the clavicle, which was, however, unnecessary, and finally succeeded in stopping the haemorrhage by means of haemostatic forceps applied to the wound in the vein, guided by the touch of the fingers, as it was impossible to apply them by sight. The wound was disinfected and carefully packed with iodoform gauze. On the third day an attempt was made to remove the forceps, but as venous haemorrhage recurred they were left in four days longer; recovery.

Axillary Vein.—Arendt³³⁹ reports a case of punctured wound of the left axillary vein. The patient had lost a great deal of blood and the author ligated, through the wound, two larger veins close to the axillary vein, and the haemorrhage ceased. Severe pain in the arm and paralysis of the radial nerve necessitated re-opening of the wound a week later, and a wound in the axillary vein two centimetres long was found close to the ligated veins. The severe immediate haemorrhage was stopped by digital pressure, and the wound in the vein closed by six artery-forceps, which were left in for three days. The operation was successful, but the paralysis persisted.

Ligature and Suture of Veins; Vena Cava Inferior.—Schede²²⁶ reports a unique case of suture of a large wound in the vena cava inferior. The patient, a man of 48, had a large carcinoma of the right kidney for which lumbar nephrectomy was made. A piece of the peritoneum about the size of a hand was removed. The elastic ligature around the short pedicle included part of the lateral wall of the vena cava. The renal vein was buried in the tumor. After compression of the vena cava above

and below the ligature by means of sponges on long forceps, the ligature was removed, revealing a longitudinal defect two centimetres long in the wall of the vena cava, from which considerable haemorrhage, coming from the opposite renal vein, occurred. The wall of the vena cava was grasped with two artery-forceps applied parallel to the axis of the vein, one above and one below the wound, which converged so as to include the defect and control the haemorrhage. The wound in the vein was united with a continuous catgut suture. Haemorrhage was completely controlled, and at the death of the patient, eighteen days later, from acute fatty degeneration of the liver, heart, and left kidney, the wound in the vein was found perfectly healed without a trace of thrombus formation and without any material diminution of the calibre of the vessel. The author has, for a number of years, made use of the continuous catgut suture for the closure of wounds in large veins, whenever the occasion arose during operations, in twenty-five or thirty instances, most of them wounds in the deep jugular vein, two in the subclavian, three in the axillary, and two in the femoral vein. When the large vein has been freely dissected out in the course of the operation, digital compression above and below will control haemorrhage during the suture. If the vein has not been freely dissected out, the wound in the vein is included between artery-forceps to control haemorrhage during the suturing. The author uses fine Hagedorn needles and the finest catgut, which swells up and thus prevents haemorrhage through the stitch-canals. He considers it immaterial whether, in the approximation of the wound in the vein, intima is in apposition with intima or adventitia with intima. Healing takes place without exception if the wound remain aseptic, and he has never had occasion to suspect the formation of a thrombus in the line of suture. In one case of suture of the internal jugular vein an autopsy was made three months after, which revealed no abnormality in the sutured vein.

Niebergall,³⁰¹ in an exhaustive paper based upon all the cases he could collect from the literature, considers the methods of haemostasis in lateral injuries of the veins, namely, aseptic tampon, lateral ligature, suture, and lateral or total compression with artery-forceps. (1) Aseptic tampons in small punctured wounds may effect healing without obliteration of the vein. (2) Lateral ligature must

be made with strong silk, and can be used only in small wounds in a healthy vessel-wall, but is uncertain on account of its liability to slip; it also necessarily causes some diminution in the lumen of the vessel. (3) Suture. Ten cases from the literature and Horoch's experiments on animals have led the author to conclude that suture in small longitudinal and transverse wounds insures against primary haemorrhage. It should be made with small, round needles. Catgut should be used, and the suture should be a continuous surface, or quilt suture. In deeply-situated veins it is difficult to apply the suture, and for this reason the author prefers (4) lateral or total compression with artery-forceps left in for a limited time,—twenty-four to forty-eight hours. He has collected fifty-three cases with eight deaths, a mortality of 15.1 per cent. None of the deaths could, however, be attributed to the method. Küster has made use of this method for several years. His procedure is as follows: The wound in the vein is grasped with one or more forceps, which include as little of the wall as possible, and packed and dressed antiseptically. The forceps are removed in twenty-four hours, and the wound sutured. The forceps never inconvenience the patient, and the wounds, as a rule, heal readily. The method is trustworthy if asepsis is obtained, and no secondary haemorrhage ensues. The permeability of the vein is preserved, though proof from autopsy in the human subject is wanting. This method takes in less of the wall of the vein than the suture, is easier of application to deep-seated veins, and is thus applicable to all cases.

Romme¹⁶⁴,_{July 6} has collected 12 cases of suture of wounds in veins in addition to the 30 collected by Schede. From these 42 cases, of which only 1 died from sepsis, he concludes that the suture is superior in such cases to the lateral ligature.

Trzebicky and Karpinski¹⁶⁵,_{May 11} have studied experimentally, by injections on the cadaver, the question of collateral circulation after ligature of the femoral vein. They injected Treichmanu's cement into the small saphenous or popliteal vein. In 31 experiments the injected mass passed through the collaterals only eighteen times, but the authors think that in some cases the establishment of collateral circulation is easy, but that in others it is difficult, or even impossible. Vertical suspension or elevation of the leg and cautious massage aid in the establishment of collateral circulation.

Common Femoral Vein.—A. von Bergmann ⁸⁸ reports a case of a man, 21 years old, who, while grinding a piece of metal, received a longitudinal wound one and a half centimetres long in the right femoral vein, above the entrance of the long saphenous vein. The injury was followed by profuse haemorrhage. Speedy ligature of the saphenous and the distal end of the femoral vein was made. When brought to the hospital and the provisional dressing removed, the haemorrhage recurred. Poupart's ligament was divided and the proximal end of the femoral vein ligated. This did not stop the bleeding, however, and ligature of the distal portion lower down, followed by the excision of the intervening piece of the vein five centimetres in length, was made. By this means the haemorrhage was finally stopped. The limb was slightly cyanotic after the ligature, but twenty-four hours later the color and temperature were normal. At no time was œdema of the extremity to be noticed. The author points out that the danger of gangrene, which led Kraske to propose to ligate the artery simultaneously, is probably not so great as the inefficiency of the collateral circulation in experiments on cadavers might lead us to believe. Of nine cases collected by Chwolzow, only one was followed by gangrene of the limb.

The question of ligature of large veins, and especially the common femoral vein, has been investigated from a clinical stand-point by Chwolzow, ⁸⁹ who has collected from literature nine cases of isolated ligature of the vein for injuries, with only one instance of gangrene. In twenty-six cases of extirpation of tumors, the vein was ligated or partially extirpated, and no gangrene followed. Simultaneous ligature of both veins and arteries gave very different results. In 14 cases of traumatic injuries there were 6 cases of gangrene, and in 20 cases of extirpation of tumors gangrene followed in 9 instances. In one early fatal case there was incipient gangrene. This makes 50 per cent. of gangrene; thus the danger of gangrene following isolated ligatures of the common femoral vein is small; but as it cannot be said that gangrene may not ensue in isolated cases, the author considers the conservative treatment of wounds of the large veins to be the following: Sutures can be used to close the wound in the vein if the borders of the wound are clear-cut and the wound easily accessible. Parietal ligatures may be used in

small wounds not larger than one-half centimetre long, if the wall of the vein is healthy and the wound is not readily accessible for suturing. Closure of the wound in the vein by artery-forceps, left in place for twenty-four hours, may be tried in deep-seated wounds with contused borders, even if the wound in the vessel is large; but if haemorrhage threaten at the removal of the forceps, we must resort to circular ligature. Ligature of the vein is preferable in all irregular, contused wounds, gunshot wounds with doubtful vitality of vessel-wall, and when the wound is not reliably aseptic. It is as yet doubtful whether a completely severed vein can be reunited by suturing. Extensive extirpation of portions of the large veins in cases of removal of malignant tumors is safe, as clinical experience has proved that gangrene does not follow in these cases. The author made extensive investigations on the cadaver to establish the efficiency of the collateral circulation after ligature of the common femoral vein. In seventy-nine experiments he found it impossible to inject fluid into the vena cava from below the ligature in only 10 per cent. of the cases, and it seemed immaterial whether the femoral vein was tied above or below the entrance of the saphenous vein. It is not permissible to conclude from these investigations that gangrene will follow in 10 per cent. of the cases of ligature, and the author believes that the prognosis for the ligature in the living subject is more favorable, his opinion being based on the clinical observations above cited.

Fraser⁶, reports a case of lateral ligature of the internal jugular vein. During the extirpation of tuberculous cervical glands a transverse cut was made in the vein, about half an inch long. Clamps were placed on either side of the cut, and a lateral ligature of stout silk applied. The ligature included so much of the vein-wall that the tension on the vein necessitated the bandaging of the head in flexion. Recovery.

THROMBOSIS OF VEINS.

Hugh Smith², reports a case where possible microbial infection led to thrombosis of the vena cava inferior. The symptoms were, first, œdema of the right lower extremity from thrombosis in the iliac vein. A week later the extension of the disease to the vena cava was indicated by œdema of the left lower extremity, the

scrotum, penis, and the lower fourth of the abdominal wall. After five months the œdema had subsided so far as to permit the patient to sit up; and it disappeared entirely after two years, leaving a partial dilatation of the superficial veins in the abdominal wall in the femoral region.

Herczel,¹⁴ reports, to the Royal Society of Physicians, Budapest, a case of successful operation for thrombosis of the transverse sinus and internal jugular vein. Suppuration in the right ear was followed by symptoms of general sepsis, pain, and swelling in the upper sterno-mastoid region. Trephining over the transverse sinus showed osteomyelitis. Opening over the transverse sinus showed a red thrombus. The wound was packed. The symptoms were relieved for two weeks, when the temperature again rose and the swelling on the neck extended downward. Incision over the jugular vein showed perforation of its wall, and the vein was filled with a fetid, disintegrated coagulum. The vein was ligatured deep down and the coagulum removed; recovery followed.

PHLEBITIS.

A case of fatal infectious phlebitis of the left femoral vein is reported by Villeneuve.⁴⁶ Traumatic phlebitis in right leg, accompanied by reflex œdema in the left leg, has been described in a report of a case by Vaquez and Bureau.¹⁴ Intra-venous injection for Asiatic cholera had been made, two weeks previously, in the right saphenous vein, followed by phlebitis. On the left side, where no injection had been made and no traumatic cause could be found, an œdema developed from the thigh down to the middle of the calf, which was painless and disappeared in five days. The authors regard this condition as a vasomotor reflex, analogous with reflexes described by Ravier from experiments on animals.

VARICOSE VEINS.

A varicose condition of the internal saphenous vein at its juncture with the femoral vein, simulating femoral hernia, was operated upon by Rose.²² There was impulse on coughing, and the differential diagnosis could not be made until the operation, which consisted in the excision of three inches of the vessel.

Tillier¹⁰⁵ advises an operation for varicose veins of the lower extremities by excision of portions of the vessels and partial re-

moval of the covering skin when it is too thin and tense. He has seen necrosis of the atrophic skin follow the operation in a case in which it was dissected and not removed.

Excision of the saphenous vein for voluminous varices of the limbs, as recommended by Trendelenberg, was resorted to in four or five cases by Raynier,¹⁴ with good permanent results. In the discussion of the paper, Ricard speaks less enthusiastically of the operation, and thinks it should be limited to severe and painful cases.

Laplace⁶¹ advises a new method for the radical cure of varicose veins, which consists of ligature of the long saphenous vein near the point of entrance into the femoral, and of the short saphenous between the heads of the gastrocnemius. By this combination of ligatures the author expects to stop the entire superficial circulation of the leg, by causing thrombus formation in all the varicose surface veins, followed by obliteration. In the first case operated upon, varicose veins of both legs, consequent on an old fracture of the left femur, after local anæsthesia by cocaine injection, the long saphenous veins on both sides were ligatured. The short saphenous veins were taken up in a similar manner by making an oblique incision about two inches below the centre of the popliteal space. All the varicose veins could be felt hard and distended. A snug cotton compress and bandage were applied from the leg to the upper femoral region, and the limb slightly elevated upon pillows. Three days later, when the bandage was removed, the veins were thrombosed, hard and nodular, covered by yellowish-green discolored skin. They gradually became smaller and harder, and at the end of the second week the patient walked without pain. An exactly similar course was observed in all 17 of his cases. In 7 the operation was performed on both legs in immediate succession, and in 10 upon one limb only. In 1 case the author was unable to find the saphenous vein, which was probably absent—an anatomical anomaly. In 7 of the 17 cases, the only ones which the author was able to trace later, the result remained satisfactory.

Experimental Varix.—Tzoncin¹¹²⁹ has attempted to produce experimental varices in dogs by section (on one side) of the chain of the abdominal sympathetic. The animals were killed eight, seventeen, two hundred and thirty-six, and two hundred and fifty-

six days, respectively, after the laparotomy and unilateral section of the nerves and ganglia of the great sympathetic.

The microscopic examination was particularly directed to the saphenous veins; the veins of the side operated upon were compared with those on the healthy side. At the autopsy minute dissection showed, in general, that the veins on the operated side were more sinuous and of larger calibre; the dilated veins being, at certain points, double the size of their healthy counterparts. The microscope showed augmented volume of the arterial vasa vasorum as well as a thickening of their walls on the operated side; diminution of those nerve-fibres not surrounded by myeline in the nervous branches on the same side; but this fact, observed upon transverse section, is not conclusively proven, conjunctive proliferation having sensibly modified the texture of the middle and external nerve-membranes, the internal tunic remaining intact.

ORAL AND FACIAL SURGERY.

BY RUDOLPH MATAS, M.D.,
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ORAL SURGERY.

JAWS.

Fractures.—A case of fracture of the jaw, with traumatic aneurism, is reported,^{Dec. 17, '92}² in a builder, aged 23, who sustained a fracture of the lower jaw on the left side, together with concussion of the brain. Some days later an abscess formed on the right side, and was opened. He left the hospital on August 8th, but returned, on August 18th, with fresh abscess-formation over the right side of the jaw; this was likewise evacuated. On August 31st he was seized with a sharp pain on the right side of the face, and, on examination, a pulsating swelling was discovered in the parotid region. The house-surgeon was summoned, and, considering the pulsation to be merely transmitted from the carotid artery, cut into the swelling, giving exit to a small quantity of pus, which, however, was immediately followed by a gush of blood, when it was discovered that a traumatic aneurism had been laid open. Wainwright was called and found a second and hitherto unsuspected fracture of the jaw just below the right condyle. The right common carotid artery was ligatured, and the wound healed readily, but a fortnight later hemiplegia slowly developed, associated with mental weakness, culminating in dementia. The mental symptoms subsequently improved to a limited extent. Wainwright said that the hemiplegia occurred on the sixteenth day after the ligature of the common carotid.

A case of double fracture of the lower jaw, which successfully united *six* months after the accident, in a young and vigorous subject, is reported by Rueker, of Oakland, Cal.⁷⁷

Robert C. Ackland² describes an apparatus for fractures of the lower jaw. He says: "The common method of treating fractures of the jaw with four-tailed bandage and gutta-percha may

fairly be considered unsatisfactory and inefficient. To provide a really effective and permanent splint for the jaw the surgeon has often to call upon a dental surgeon for a special apparatus, and thus much valuable time may be lost before the fracture can be set. I wish to draw attention to a new form of apparatus which I have devised for fractures of the *horizontal portion* of the jaw. The following are the chief advantages which may be claimed for it:

" 1. Its mode of application being apparent as well as simple, it can be applied in a few minutes owing to its being universally adaptable. A Hammond, although theoretically a perfect splint, is the work of a special mechanic, and takes time to make; when made, it is extremely difficult to apply properly. Interdental splints also take time to make. The Lonsdale is costly, cumbersome, and complicated.

" 2. It can be applied over and over again in different cases without alteration or renewal. Most costly special splints are useless after the one application.

" 3. Its parts, being of plated metal, are easily kept clean. Bandages need not be used with it. It allows of free application of cleansing washes within the mouth.

" 4. Its application involves no other part but the lower jaw. It interferes but little with eating and drinking or speaking and sleeping, because of the swivel action of its clamps.

" The splint merely consists of a plated metal horseshoe-shaped piece which rests upon the teeth, or gums if there be no teeth, and a similar one which is applied below the chin. These are fastened together by two movable clamps. To apply the splint the mouth-plate or metal gutter is lined with ordinary splint gutta-percha. This is warmed and driven down on the teeth and gums as far as the shallow plate allows. An untrained assistant can hold the fragments in position whilst this is being done, or, if necessary, the surgeon himself can do this with his disengaged hand. The chin-plate, lined with two layers of wash-leather, is put into position and held there. The swivel clamps are then fitted on to both plates, and by the thumb-screw to each can be made to clamp the plates together until the requisite tension is attained. I have had several opportunities of treating fractures of the lower jaw with this splint at St. Bartholomew's Hospital, and I find the results eminently satisfactory, excepting in cases where severe inflamma-

tion interfered to a certain extent with the application of the chin-piece."

A valuable contribution to the history of interdental splints in their application to fractures of the jaws, and especially to the Gunning splint, is made by J. Adams Bishop.⁸⁰⁸ W. Carr⁸⁰⁸ makes a special plea for the Williams modified interdental splint, which is an improvement on the Gunning splint. The principal advantage of this lies in the fact that the patient is enabled to continue his usual occupation without attracting special attention to his condition, as there are no special appliances connected with it. He cannot masticate, but receives nourishment in a liquid or semi-liquid form.

Barrett, of Neenah, Mo.,¹¹⁷ reports his successful experience, in fractures of the upper dental arcade, with a vulcanite supra-dental splint made from an impression and held in place by atmospheric pressure.

P. Martinier, of Paris,⁷⁸¹ reports a case of compound fracture of the lower jaw, caused by extraction of a tooth with a key. No treatment was attempted for a month, and abundant suppuration occurred at the seat of fracture, with multiple sequestra and general septic manifestations. Local antisepsis was employed, with removal of sequestra and application of supra-dental splints. Recovery followed.

Dislocations.—A rare case of luxation of the lower jaw backward is reported by Bischof.³⁴ After referring to the extreme rarity of this condition, especially in men, the author reports a case in a young consumptive, aged 19, in whom the luxation appears to have been caused by excessive opening of the mouth during pharyngoscopic examination. The diagnosis was based chiefly upon (1) the impossibility to open the mouth, associated with the very slight mobility of the lower jaw; (2) the recession of the lower incisors behind the upper ones with closed mouth. The author was not able to account for the occurrence of this special type of dislocation, but suggests that the condition of the ossa tympanica in this patient may have been the same as in women. In this case a reduction was not effected owing to the extreme prostration of the patient, who was in the last stages of phthisis. After death a necropsy was not allowed; so that the anatomical conditions were not verified by actual examination.

Occlusion.—Several very instructive cases illustrating the extreme types of ankylosis of the temporo-maxillary joints are reported, in all of which the operators gave preference to resection of the condyles above all the other proposed methods of relief. Ollier²¹¹ presents a typical case in which there is hardly any separation between the teeth, and the lower jaw was atrophied and undeveloped. The complete resection of the condyles and ossified temporo-maxillary joint on both sides was followed by an excellent nearthrosis, permitting a separation of three centimetres between the teeth.

Demons¹⁸⁸ presents a case in which ankylosis of the lower jaw had been caused in a baby by ossifying arthritis resulting from unskillful application of forceps by a midwife. The age at time of operation was 11 years. An osseous mass filled the temporo-maxillary space, which was gouged and chiseled out, but the mouth could not be opened until the coronoid process with the temporal insertion was sectioned. This gave a good functional result. Another case of resection of the temporo-maxillary joints for ankylosis caused by a fall on the jaw is reported by Barker, of London.⁶² The subject was a girl aged 15. The author thus expresses himself with regard to arthrectomy: "It has the manifest advantage, over all operations from within the mouth, that it can be kept from suppurating. This, besides diminishing immediate risk, must improve the prospect of ultimate free movement. Experience of aseptic excisions of joints in recent years teaches us that we have a far better prospect of restoration of function than in the days when suppuration followed excision in most cases. Again, the advantage of this method over that which aims at establishing a false joint at the angle of the jaw must be obvious, inasmuch as the new joint is made as nearly as possible at the seat of the natural articulation, and, consequently, the functions of the muscles and the jaw itself are as nearly as possible restored. The chief risk of the operation now described is that the facial nerve may be injured, but, as is proved by this and other cases, notably by those recorded by Page, this can be avoided by care and by an horizontal incision. The slight transient paresis of the orbicularis muscle, which followed the infection in the above case, was probably due to mere stretching of some nerve-filaments, which soon recovered themselves."

The subject of ankylosis of the temporo-maxillary joint has also been discussed by McCosh and McBurney.⁹⁶ McCosh presented a patient, female, aged 26, who suffered from this ankylosis in consequence of arthritis, probably from sepsis following a four-month miscarriage. The teeth were firmly fastened against each other, the slightest separation being impossible. For a year the patient had subsisted on soft or fluid food, introduced into the mouth through a gap caused by the extraction of two incisor teeth. The neck of the condyloid process of the inferior maxilla being exposed by a transverse incision along the lower border of the zygoma from a point anterior to the base of the tragus, and extending toward the median line for about one and one-quarter inches, a second incision, at right angles to this, was made downward from its middle point. This latter incision extended through the skin only, so as to avoid injury to branches of the facial nerve. The transverse incision was then deepened until the condyloid process of the inferior maxilla, just below its head, was exposed. It was then found that there was complete bony ankylosis in the temporo-maxillary articulation, and between the head of the bone and the lower surface of the zygoma. There was considerable new bony formation about the joint, and it was impossible to estimate where the neck of the condyle joined the head. The condyle, neck, and inner surface of the zygoma seemed to be welded together into a solid bony mass. The condyloid process was divided with a chisel just below the condyle, and again at a point two-thirds of an inch below, and the intervening portion of bone, a little over one-half inch in length, removed. The coronoid process was then found to be adherent to the zygoma. This was chiseled through. The same procedure was done on the other side, and the teeth, with the aid of a dilator, could now be widely separated. The haemorrhage was free, but was controlled by pressure. The wounds were sutured without drainage. Primary union resulted. On the sixth day the patient could chew solid food. There has been no injury to the facial nerve or to Steno's duct, and the scars are so slight that really no disfigurement has resulted.

McBurney had a case illustrating a different stage, the ankylosis having been present twelve or fourteen years, due to disease, probably tubercular, which had occurred in childhood. Owing to so early an arrest in the development of the lower jaw and its

muscles, the patient's chin looked like that of an Aztec. McBurney had operated, intending at first to do the operation practiced by McCosh, but the atrophy of the temporal muscles was such that it was impossible to get even a finger-nail between the teeth. It was necessary to cut away the coronoid process on both sides, together with the head and neck of the lower jaw, after which the result obtained was very satisfactory. The mouth can now be opened an inch and a half. The operation can be performed by making a vertical instead of an horizontal incision, and the resulting scar is much less.

E. Bergmann, of Berlin, ²²⁸ contributes a valuable paper on the clinical history of anthrogenous ankylosis of the jaws. ¹³ In the anthrogenous types of ankylosis of the temporo-maxillary joint we should differentiate between the pure anklyosis of the adult, in which there is a full development of the jaw, and those cases in which there is atrophy or defective development of the jaw. When the ankylosis occurs in the adult, the size of the lower jaw is not diminished. It is different when the ankylosis occurs in childhood, during the period of development,—those cases, for instance, which result from suppuration of the ear communicating with the joint. Here the lower jaw remains undeveloped from the moment that the movements of the joint are arrested.

The smallness of the lower jaw gives to the adult face, then, the peculiar appearance that has been compared with a bird's face ("Aztec face," McBurney). Von Bergmann carefully reports a case of this sort in a girl, aged 20 years, in whom the ankylosis was caused by a traumatism of forceps during delivery. The difficulty in opening the mouth was noticed immediately after birth. After the third year the teeth could not be separated. He resected the joint, which was nothing but a hard, callous mass. After the operation two fingers could be easily introduced between the teeth, but no effect could be produced upon the retraction of the soft parts or upon the recession of the jaw. A dental surgeon constructed an apparatus by means of which the recession of the lower jaw was very greatly influenced, and in the course of a year some success was obtained in correcting the excessive contraction of the soft parts and in remedying the deformity. The author says it is, therefore, possible that the chin can be gradually brought

a little forward after the re-establishment of the thorough mobility of the lower jaw, and the ugly, receding chin thus remedied to a certain extent.

Operations.—Bardenheuer,²²⁸ _{v.4, p. 64; v.5, p. 112} in operating on the upper jaw, resects the bone, the defect in the palate being closed by two flaps ; one is formed from the inside of the cheek, this latter being split into two flaps, the outer being sutured to the skin below the incision. The other palate flap is taken from the forehead with a pedicle just below the ear. This flap is brought down and fitted in place in the roof of the mouth, covering the flap taken from the cheek. In partial resection of the lower jaw a rectangular flap with its base up is made, equal in extent to the part to be removed. A flap is taken from the forehead and twisted around and laid in the wound in the mouth. The rectangular skin-flap is then brought down and sutured in place. The object of these skin-flaps is to promote healing and prevent cicatricial contractions. The patients on whom the author performed these operations recovered satisfactorily and the results were excellent ; the unsightly depressions that are left by the usual operations were absent.

Pantalone,¹⁰⁴⁸ _{v.2, p. 151} concludes that, by the use of the position recommended by Rose in operations upon the superior maxilla, the use of the gag of O'Dwyer, the fixation of the tongue by forceps, and the haemostatic use of tampons, perfect antiseptic conditions can be had without the annoyance of haemorrhage during the operation, while complete narcosis can be maintained throughout the operation by the interrupted method of chloroform anaesthesia. These procedures, he believes, make unnecessary a previous tracheotomy and ligation of the external carotid, as also ligatures during or after the operation.

E. Liceaga¹⁷⁹ _{v.6, p. 16} proposes a conservative modification of the methods ordinarily practiced in resection of the upper jaw, by which he expects to exclude all bleeding into the mouth and the naso-pharynx. This can be accomplished only in cases in which the palatine surface of the maxilla is not involved and the diseased jaw is edentulous. As the haemorrhage becomes dangerous only through its penetration into the naso-pharynx, he plugs the corresponding nasal chamber with an aseptic tampon and resects the bone by detaching it carefully from the nasal and buccal mucoperiosteal surfaces which are left behind. This resection has to be

effected through a facial incision made on Langenbeck's lines. If any teeth are left in the afflicted jaw they should be removed some time before the operation in order that the gingivo-buccal mucosa may be well healed before the resection is completed. This operation is especially indicated in benign tumors which do not affect the nasal and buccal surfaces of the maxilla, as it completely precludes all dangerous overflow of blood into the naso-pharynx. The author relates several cases which appear to bear out the correctness of his suggestion.

Vautrin, of Nancy, ¹⁴ reports a case of cancer of the tongue, floor of the mouth, and lower jaw, which illustrates the benefits of immediate prothesis of the jaws after resection. Steinthal ¹⁸⁸ _{April 10} reports a case of carcinoma of the inferior maxilla, which also shows the value of immediate prothesis after resection of the lower jaw; though in this case the artificial lower jaw had to be removed later on in the history of the case, because it acted as an irritating foreign body. Nevertheless, it served a very beneficial purpose in anchoring the tongue and shaping the soft parts immediately after the operation.

TEETH.

Abnormal Development of the Teeth, Forming Tumors of the Jaw.—O. Hildebrand, of Göttingen, ³⁰¹ _{B.M.B.S.; July 22} makes a further statement upon the case which he reported in 1889, in which the child of 12 years, who had been submitted to various operations, had been relieved of between one hundred and fifty and two hundred teeth of various sizes. In July, 1891, the patient was again presented at the Göttingen Surgical Clinic; the two lower jaws were much thickened, as also the right upper jaw. On the whole, there were found seventeen teeth, part of them normally developed, others in an undeveloped condition; their position was deviated and irregular. From the upper and lower jaws there were again some masses of teeth removed which had the same conformation as those formerly described, and represented about one hundred and fifty teeth; aside from this, there were found two round, glassy bodies, about the size of two peas, which, upon microscopical investigations, showed themselves to consist of tooth-structure. The construction of teeth in this patient will continue, in all probability, until the soft tissues have all reached their final development, which will include the epithelial structure of the

teeth. Malassez expressed the opinion that unilocular cysts of the jaw are formed at the expense of paradental epithelial *débris*. This opinion has been generally adopted, but the cases in which the anatomical conditions are demonstrable are rare, as Albarran, in his memoir (1888), only succeeded in securing specimens for two histological examinations. The case reported by Forgue,³⁴⁸ _{No. 3, p. 44} (a unilocular cyst of the upper jaw) is important. The examination made by Kiener showed that the walls of the cyst were formed by fleshy granulations covered by a peculiar epithelium. This epithelium presented all the characteristics of adamantine epithelium.

An interesting case, showing the difficulties in diagnosis of a dentigerous cyst due to an unerupted deciduous cuspid, even after repeated microscopical examinations, in a girl aged 13, is reported by Mullett, of Iowa.⁸⁰⁵ _{July}

Dunogier¹⁸⁸ _{No. 26} reports a case in which a wisdom tooth was heterotopically placed under the first molar, causing suppurative osteo-periostitis of the jaw. Extraction of the first molar was performed, but inflammatory disturbance persisted, the third molar appearing at the site of the extracted first molar. Extraction was followed by recovery.

Delacour²²⁰ _{No. 28} also reports a delayed eruption (thirty-ninth year) of the wisdom tooth associated with very painful symptoms,—phlegmon in the submaxillary region and closure of jaws. Extraction of the tooth was performed under chloroform, recovery following.

Fistulæ of the Chin.—This is the subject of a thesis by Bellemain.²¹² _{No. 25, 1903} Fistulæ opening in the chin are most frequently caused by disease of the incisors, notwithstanding that the teeth may appear to be perfectly sound. The usual cause is an alveolo-dental arthritis (Malassez). The infection of the alveolar region can be effected by an apparently insignificant erosion or caries of the enamel. The crown may appear perfectly healthy, and yet an abundance of pus may be hidden in the alveolo-dental space, below the neck or crown. A careful examination through the fistula, or of the teeth themselves, will reveal the true condition. The abscess may be drained by drilling through the alveolus to the root, or by extraction; if the disease is not too extensive, immediate tooth-grafting may be resorted to with success.

SALIVARY GLANDS.

A piece of grass in Stenson's duct creating inflammatory and salivary disturbance, in a child aged 10 years, is reported by Desmartin.¹⁸⁸ The author comments on the greater frequency of foreign bodies in Wharton's duct.

Acute ranula resulting apparently from excessive drinking of iced lemonade, and threatening the life of the patient by asphyxia, is reported by Geraud.²⁴³ Incision of Wharton's duct promptly relieved the symptoms.

Wyeth³³, showed several calculi removed from the right side in a little girl of 4 or 5 years, who had been supposed to have lymphangiectasic tumor of the cheek, for which she had been submitted to two or three operations. When he cut into the tumor the calculi were felt, and after they were removed the girl made a complete recovery. Gerster³⁹ also reported a case of salivary calculi in Wharton's duct, presenting analogous features.

A remarkable case of cystic degeneration of enlarged submaxillary glands is reported by Hays.⁹ The growth measured fifty inches in circumference, weighed forty-seven pounds, and consisted of a multilocular cyst filled with a greenish-yellow fluid. Its possessor was a woman 73 years of age, and it had been growing for forty-three years. Apparently it was a cystic enlargement of a submaxillary gland. It was never removed during life.

Dombrowski²¹ reports a case of lympho-sarcoma of the left submaxillary region in a patient aged 36 years. The tumor grew very rapidly and involved the parotid, which had to be extirpated during the operation. Five months had elapsed and still there was no recurrence. The same operator had extirpated the parotid for sarcoma seven years previously, and no recurrence had been noticed. These, with several other cases of extirpation of sarcomatous growths in other localities, led the author to look favorably and encouragingly upon the operative treatment of even far-advanced sarcomatous growths.

LIPS.

Fistula.—A congenital fistula of the upper lip, in a male aged 30 years, is reported by Feurer.²³⁸ It was situated at the junction of the vermillion border with the skin, admitted a probe a distance of twenty-two centimetres, and terminated on a level

with the gingivo-labial junction as a blind fistula. It was completely extirpated, with excellent results.

Tuberculosis of Upper Lip.—Eiselberg had a patient, a man aged 52, who had been operated on for a large swelling in the upper lip. He had had syphilis formerly, with a sore on the upper lip, but after treatment it disappeared, leaving a hard swelling about the size of a hazel-nut. Microscopical examination of an excised portion revealed a number of large cells with the surroundings infiltrated, which were diagnosed as tuberculous. The whole was removed, and the wound well washed out with nitrate of silver. A plastic operation was necessary afterward. Störk treated a young man who had a large ulcer on the upper lip with all of the tuberculous phenomena. The galvano-caustic treatment was energetically followed with a successful result, but the patient shortly after died from phthisis.

TONGUE.

A case of leukokeratosis (leukoplakia) of the tongue and lips, with papillomatous epithelial degeneration, in which permanent recovery was obtained, is the subject of a careful study by Perrin, of Marseilles.⁴⁶ The author concludes by urging the necessity of early surgical interference in lingual leukoplakia. “The only treatment for these leukokeratoses is their complete extirpation by surgical means. It is the only way to avoid the final evolution of this disease into true epithelioma.”

Broome,⁷⁸⁶ _{Apr.} reviews the various operations on the tongue and mouth in a short plea on “Surgical Operations for Malignant Disease of the Mouth and Tongue without an Anæsthetic.” A case of angioma of the tongue requiring ligation of the common carotid during the operation, followed by death two days after, with cerebral symptoms, is reported by Wheaton, of Minnesota.¹⁰⁵

Kemmer, of Paris,¹⁹⁷ _{Jus. 20} reports a case of extirpation of the tongue, part of the tonsil, and soft palate, preceded by disarticulation of one of the temporo-maxillary joints, in a male patient, aged 41 years, suffering with extensive malignant ulceration of the tongue. The patient survived ten months after the operation; recurrence followed three months after. The external carotid was ligated as a preliminary to prevent hæmorrhage, with excellent hæmostatic results.

Hutchinson, of London,⁸⁰⁶ reports a case in which pneumonia followed an écraseur (cold wire) amputation of the tongue by the author's method. The patient, aged 45 years, however, recovered. The author says: "My operations of late years have all been by means of the écraseur with a cold wire, thus entirely avoiding all risk of haemorrhage and subsequent danger from the passage of blood into the trachea. The critics of this operation are fond of suggesting that the wound left by the écraseur is apt to be for a time in an unhealthy condition, such as may easily permit of septic infection of the lungs. To this my reply has always been that, although I have done many such operations, I have never, in a single instance, encountered pneumonia afterward. I am speaking as to the results of private practice, for at the London Hospital I did once lose a patient from pneumonia after excision of the tongue. Nor am I any longer in the position to renew my boast as to operations in private, for I have just had to deal with a very critical case. In the present instance, for the first time in my practice, a spray was used by a too zealous nurse, who had employed it in other cases. It occurs to me as quite possible that a spray is the very best means of facilitating the inhalation of septic particles, and that very probably a mouth-wash is far safer. I shall most certainly, in all future cases, forbid the use of the spray, and keep strictly to an old, well-tried friend. The mouth-wash which I use is made by putting two tablespoonfuls of spirits of wine into a tumblerful of water. If the wound is unhealthy, I frequently have it swabbed with a much stronger solution."

Sachs, of Berne,^{228, 11} reports sixty-nine cases of cancer of the tongue. The cases of this disease observed in Kocher's clinic during the years 1872-89, with details as to the frequency of the disease, the infiltration of the glands of the neck, the differential diagnosis, and the different methods of surgical treatment and their results, are discussed.

Schulten, of Helsingfors,^{301, 11} writes on total extirpation of the tongue and its influence on speech. Many authorities state that extirpation of the tongue has no influence upon speech, but this applies only to cases of partial extirpation. In cases of total extirpation the speech is changed, and, instead of *h* and *t*, the patient says *p*; instead of *m*, *n*. Büdinger, of Vienna,⁷⁶¹ states

that, in Billroth's clinic during ten years, from 1881 to 1892, 116 men and 6 women were operated upon for carcinoma of the tongue and floor of the mouth; 132 operations were done upon these 122 patients,—68 times with ligature of one, 19 times with ligature of both lingual arteries. Tracheotomy was done 6 times. In the mouth the following operations were done: Partial removal of the tongue, 40 times; amputation of one-half of the tongue, 23 times; total amputation of the tongue, 9 times; partial resection of the floor of the mouth, with or without the operation on the tongue, 29 times; temporary resection of the under jaw, twice; resection of the under jaw, 8 times; chiseling out diseased portion of the under jaw without breaking its continuity, 16 times; enucleation of half of the under jaw, once; extirpation from without, 4 times. The mortality as a direct result of the operation was 10 per cent. The after-history of 64 of the patients was obtained, and of these 10 were free from recurrence for periods varying from fourteen months to eight years after the operation. The best results were obtained in those cases in which extensive operations were not necessary.

FACIAL SURGERY.

NOSE.

"An eligible method of repairing a broken nose" is thus described by Daily, of Pittsburgh.¹ "On the fourth day I had the patient lie down in my office, and, taking a piece of felt from a white felt hat, I cut it into the shape of an X, making the arms of the letter long. This I moistened and molded to the nose, forehead, and lower parts of the cheeks, having the fragments properly adjusted. Then, taking a piece of heavy sheet-zinc, I cut it with strong scissors into the same shape, but smaller, and bent it to fit the curves of the forehead and nose. This I punctured around its border and sewed to the felt; I then took another piece of felt of the same shape as the first and applied it over the zinc. This I soaked in soluble glass (sodium silicate) and molded all snugly to nose, forehead, and face, holding it carefully in position until hardened. To correct the deflection of the organ to the left, I made a small pad of felt and pasted it with liquid glass on the inner side of the splint, so as to bring pressure on the left nasal bone. The splint was now temporarily removed and the nose

again examined, and, after washing out the nares with an anti-septic solution, I inserted into each naris a zinc plate, neatly covered with iodoform gauze, just large enough to fill the naris and hold the broken fragments up into place. These internal splints extended from the anterior openings back into the naso-pharynx."

Downie²¹³ describes the splints that he has found most advantageous. "I have made use of many such, but for various reasons have discarded them in favor of a lead mask, which I apply in conjunction with intra-nasal splints, also made of sheet-lead, this material being chosen for two reasons,—first, on account of the readiness with which it can be modeled to fit accurately any form of nose, or to exert additional pressure on any particular portion ; and, secondly, on account of its weight, which is an important factor in retaining the splints in the desired position. . . . After the various parts have been returned to their normal positions the intra-nasal splints are introduced. These consist of small portions of lead, in outline somewhat similar to an almond, and furnished with a wing on each side at the broadest part. These wings are bent over one side, so that when in position the flat portion of the splint lies in contact with the septal cartilage, and the curved wings lie against the inferior turbinated body. The pressure over the septum can be increased by separating the wings out from the body of the splint. When properly applied they are firmly retained within the nares, and they so fix the septum in the middle line as to thoroughly support the fractured bones at a higher level. These intra-nasal lead splints are to be preferred to both Adams's ivory plugs and to Walshaw's vulcanite plugs. Both of the latter are light and readily slip out of position, and both, when in position, completely block the nose, to the great discomfort of the patient. The lead splints, from their weight and method of adjustment, may be fixed in any desired position, and from the method of fixation the patency of the nares is ensured. These having been carefully placed in position, the external splint or mask is then fitted. It is made of one piece of sheet-lead, and consists of a nose-piece with the alar portions prolonged on each side to rest on the cheeks and give the splint steadiness, and a forehead part by which the apparatus is readily retained in the middle line and prevented from slipping downward. The whole is covered by a layer of silk or linen fabric, fixed to its surface

with gum or other paste. Before the splint is applied, it should be very carefully molded to the desired form, and when adjusted it is fixed by strips of adhesive plaster."

Weir, of New York,¹ reviews the field of nasal plastic surgery, and presents several interesting cases which illustrate the various methods that have been recommended for the correction of sunken noses,—almost all of which have been noticed in this section in previous issues of the ANNUAL. Referring to the Koenig-Israel method of rhinoplasty, he says: "Besides the scar, that is the unavoidable result of this operation, there is a disappointment not infrequently met with, in that the small portion of bone detached from the os frontis and carried downward in the flap to fill up the gap of the sunken portion of the nose becomes absorbed and disappears, resulting in a reproduction of the deformity. This I have seen occur in two instances."

He relates his experience with one patient whose nose he tried to elevate with the help of a bone-graft—breast-bone of a young duck—imbedded in the soft parts, but after eight weeks the bone had to be removed as a foreign body. He also relates his experience with C. Martin's (Lyons) platinum support for the correction of sunken nose (*vide ANNUAL* for 1891, '92, '93), and expresses himself well satisfied with the result. In one case the support had been worn one year when the paper was written, and there was then no probability of failure. In concluding, he says: "In this class of nasal deformities, the flattening of the nose, which is sometimes associated with a successfully treated harelip, can be relieved by the same incision under the lip, freeing the nostril on that side, and holding the restored nostril in position by a suture, which, securing itself in the cartilage of the ala of the flattened side, is to be left fixed to the jaw-bone. This suture was, in two of my cases, retained *in situ* in this way for a week or ten days with a satisfactory result."

Westlake, of New York,⁸⁰⁸ contributes a short account of a few cases in which complicated nasal defects were corrected cosmetically by pure prothesis. The mechanical difficulties in the way of attaching an artificial nose and ear are apparently overcome in the author's cases, and his devices are worthy of remembrance.

HARELIP AND CLEFT PALATE.

An original method of restoring the alveolar arch in anterior cleft of the hard palate and of correcting the deformity of the ala nasi in harelip is more fully described by Wyeth, of New York⁶¹ (already referred to in ANNUAL for 1893). He says: "It is a common experience that after plastic work on the soft parts in cases of complete harelip and cleft palate, which brings the lip into satisfactory position, the ala nasi of the affected side still remains misshapen, flat, and sunken. The ala nasi rests normally upon the nasal margins of the superior maxilla. If the maxillæ are normal and the alveolar arch in front complete, each ala nasi rests upon a bony surface and foundation on the same plane, and the two are naturally symmetrical. If one is deficient, the nostril of that side sinks down and out of line just as the corner of a house sags when the underpinning is not high enough. The operation of advancement of the anterior portion of the upper jaw on the short side is designed to build up the foundation. When the intermaxillary process is absent or largely deficient, we find one ala nasi resting upon a normal portion of the alveolar arch on one side, while on the other it recedes from one-half to one-fourth inch, resting upon the imperfect maxilla and alveolar process."

In four such cases Wyeth has devised and carried out successfully the following procedure: "About one-fourth inch from the edges which are to be brought into apposition a hole is drilled through the bone and a strong silver wire carried through ready for being tightened. The edges are now freshened by slicing off the mucous membrane lining the bone with a strong scalpel or scissors. With a strong pair of straight scissors in very young infants, or a bone-cutter, the alveolar arch and maxilla of the short side are divided about half-way of its length and at a right angle to the dental surface. By introducing a very strong cord of silk or wire into this fissure, and making strong traction forward on this, the undivided portion is fractured and the loosened part, by tightening the silver suture previously introduced, is brought forward, where it is firmly anchored by twisting the wire. Since the nutrition of the bone in its new position is derived temporarily from the adherent soft parts, these are not disturbed until the bone unites in the new position. From six to eight weeks should elapse before plastic work on the lip and nose is undertaken. By advancing the

bone in this manner the anterior segment of the alveolar arch is completed, and the alæ nasi of the two sides rest on the same plane."

This author dwells on the importance of early operations,—always within the first years of life, and preferably within the first weeks after birth,—provided that the nutrition of the patient is good, or, if possible, as soon as the patient is sufficiently improved by forced feeding. When these cases are left to the sixth or twelfth year, the muscles of the ala nasi on the short side are partly paralyzed from disuse, and the nostril can scarcely be made to look as well as its fellow.

Manley, of New York,⁴⁵¹ discusses the causes and treatment of harelip and reports cases. He emphasizes the views already expressed in past publications and presented to our readers in previous issues of the ANNUAL. Among the assertions that will bear repetition are that the author believes in early operating,—immediately on the day of birth even,—and that he believes in manual osteoclasis for the restitution of the hard parts. He says: "To wait until dentition is over and the alveolar structures have solidified is to let pass that stage during which it is possible to easily, rapidly, and safely restore the continuity of the alveolar arch and give the descending teeth such an inclination or direction as will restore harmony of outline. While the bones are soft, cartilaginous, and flexible restoration to position entails no loss of blood or crushing of bone. Besides, the effectual restoration of the superior dental arch relieves, to a very large degree, the tension on the soft parts, and thereby simplifies the plastic part of the operation. Indeed, osteoclasis is the key to the operation in every complicated case of harelip. Shortly after birth it is simple and safe. After dentition, under the fourth year, it is difficult; later, it is quite impossible. I have never had a case in the young infant in which I have not been able to crowd the alveolar arches into place by firm, steady pressure with the hand. This must be done thoroughly, so that the deep wire girders, which hold them in position, may not be put on a strain, and thereby set up necrosis or ulceration."

A new form of suture for harelip is described by Murray, of Liverpool.¹⁸⁷ The method of operating he adopts is, after well freeing both sides of the lip from the adjacent parts, to take a trans-

verse flap from one side of the lip only, cutting away the whole of the mucous membrane from the other side, from the nostril to the angle of the mouth. After inserting the lip sutures (he uses green gut, never having used harelip pins), the operation is completed by fixing the ala of the nostril on the affected side to the nasal septum by means of a button suture. This suture consists of two small discs of lead, with two holes about their centre; one of the discs is threaded with silver wire armed with a large needle, the wire being twisted up to the estimated thickness of the septum and ala. The needle is then passed through the nasal septum, well within the nostril, and out through the ala of the affected side, emerging at the junction of the ala with the cheek. The needle is then cut free of the wire, and the cut ends of the latter passed through the holes in the other disc, the discs approximated so compressing the ala against the nasal septum, and are fixed by twisting the wire. The button suture is not removed until the seventh or eighth day.

Murray explains that the employment of this suture not only insures a satisfactory result in respect to the nose, but steadies the whole lip, and so prevents any undue strain upon the lip sutures when the child cries. The results in the cases shown were in every way satisfactory.

R. T. Morris, of New York,¹⁸⁷ thus describes a method of removing a harelip "side-scar" and putting the scar exactly in the middle line, according to the plan devised by Phelps. After cocaineizing the lip and providing against haemorrhage and too rapid absorption of cocaine, by digital compression of the lip, the writer makes a straight line with a blue pencil from the septum of the nose to the margin of the lip. That is the middle line. On either side of this middle line he marks out a segment, which includes the harelip scar on the right side, and an equal amount of normal tissue on the left side. If two equal segments are thus removed, the margins of the wound when approximated will, of course, meet in the middle line, and there they are sutured with chromicized catgut.

Küster, of Marburg, Germany,^{113, 96} reported on his results in the treatment of cleft palate before the German Society of Surgery, at their twelfth congress. He has, in all, operated upon 22 cases, of which 13 were females and 9 males, and varying in age

from 2½ to 36 years. The last ten patients were all cured by a single operation. He employs Langenbeck's method, using anæsthesia, and operating with the patient's head hanging down. He modifies the freshening up of the edges in that he pierces the middle of the uvula by a two-edge knife and forms a flap, extending on both sides, to the posterior border of the hard palate. In this manner the velum palati and the uvula are lengthened and broadened so that it is easily applied to the bony surface. He avoids further cutting through the velum and severing the tensor palati, but rather incises the velum only so far as to cut the nasal mucous membrane with a button-tipped bistoury, where it passes over into the soft palate from within outward. Thus, any further incisions for relief of tension are rendered unnecessary. In applying the sutures to the uvula, a silk thread is passed through and held to act as a guide and to oppose tension. The whole operation lasts from one-half to three-quarters of an hour. The sutures are painted with iodoform collodion, and a tamponade of iodoform mull employed in case of profuse hæmorrhage, and then only for a few minutes. Thus primary adhesion to the exposed bone is more certain to follow. He rejects Julius Wolff's method of making lateral incisions, with employment of silver-wire sutures to relieve tension, as disadvantageous, and as favoring lateral defects. Daily irrigation of the nose is also unnecessary. Wolff's operation in two sittings for the prevention of atrophy of the flaps is only justifiable in case of a very broad fissure and very narrow flaps. To avoid gangrene of the margins of the wound, he has used in several the tertiary silver-wire suture. One can assist the healing of the wound by painting it with tincture of cantharides, and then, if complete closure do not take place, the granulating edges may be closed with silver-wire sutures. In nervous patients it is advisable to use a buccal dilator and anæsthesia. If a small spot remain open it may be helped to close by the tincture of cantharides. In order to obtain a good functional result, it is not only necessary to obtain a complete closure of the palate and a sufficiently large uvula, but also of a proper training in speaking. Speech-training, according to Gutzmann, should even precede the operation. Two cases treated after this method succeeded in obtaining ideal speech. Out of the other seven, five had normal speech, one was only moderately improved, and another remained uninfluenced. The writer

is of opinion that it is not advisable to operate as early as possible, for he does not consider the condition dangerous to life, and the aural and pharyngeal catarrh, which often complicates it, rapidly retrogresses, even in later life. He looks upon the fifth to the seventh year as the most appropriate time to interfere.

Rose, of London,¹⁰⁷⁷ in a clinical lecture on cleft palate and its treatment, presents a short *r  sum  * of this subject, on which he is so well authorized to speak. He demonstrates the four steps of the operation as follows:—

1. "The incisions and the detachment of the muco-periosteal flaps," in which he laid stress on the importance of freely dividing the attachment of the soft structures to the hamular process.

2. "Paring the edges of the cleft," in doing which he said great care should be taken not to bevel the strip, for if this happened the edges could not afterward be brought into such accurate apposition.

3. "Passage and tightening of the sutures." In passing the silver sutures Rose remarked that he had tried several methods, but had come to the conclusion that the most expeditious and convenient of them all was the loop method, which consisted in passing two loops of fine silk exactly opposite one another at each side of the cleft, threading the right loop through the left and gently withdrawing the latter so that the former is carried through the flap on the left side, as many loops being put in as are necessary, the silver wire being afterward substituted for the silk by doubling half an inch of a six-inch length of the former into a hook over the loop and gently pulling out the silk by its free ends, the wire of course following it and being left in its place; the uvula was stitched with a single silk suture.

4. "Relief of lateral tension," which consists in accurate division of the levator palati on each side.

An unusual operation for bad cleft of the palate was performed by A. Lane, of London,²², which is worth recording:—

"The child was 2 years of age. The upper lip, with the hard and soft palate, was cleft from before backward, and the cleft in the palate was of such a nature that it was hopeless to attempt to close it by any of the usual methods. On one side the palate terminated by an oblique junction with the lower end of the vomer, whilst on the other side there existed only the alveolus,

which above was directly continuous with the inferior meatus of the nose. Lane removed the mucous membrane from the margin of the hard palate on the one side, and on the other he stripped the mucous membrane from the inferior turbinated bone and from the inferior meatus, and so formed a good-sized flap of mucous tissue and periosteum, whose base was continuous with the mucous membrane lining the inner aspect of the alveolus, which formed one boundary of the cleft. This flap was then made to cover in the cleft, being connected by a continuous suture with the opposing freshened edge. There was no possibility at the time of bringing the edges of the soft palate together; so this portion of the operation was postponed till the hard palate had developed a little. Nothing could have been more satisfactory than the result which was obtained from this method." Lane pointed out that it admitted of a tolerably wide application; though he had seen very few cases like the above, in which it was so peculiarly applicable, and which were apparently not capable of being treated by the ordinary methods. [This method resembles Lannelongue's operation, by which a strip of muco-periosteum is borrowed from the nasal septum.] .

Experiences in treating cleft palate are reported by J. Adams Bishop, of New York.⁸⁰⁸ The chronological history of plastic operations on the palate (staphylorrhaphy and uranoplasty) is reviewed and the subject discussed from the prosthetic stand-point, with several illustrative cases by Ottolengui, showing the efficacy and advantage of mechanical devices (velum and obturator) in appropriate cases.

Price, of Ann Arbor,⁸¹⁴ describes a method of reducing the bony separation by means of a plate and spring. An accurate impression of the teeth and alveolar process is made, each side being taken separately, and the point of contact with the lower teeth is built up so as to present an even surface for mastication. The location and size of the lugs necessary for the attachment of the wire springs were indicated on the wax molds, to be carved into the plaster after the investment had been made. The plates were made of hard rubber and fitted to the mouth; an impression was made with them in position, and the plates removed with the impression.

A model was then obtained with the plates inserted in a

secure and relative position for the adjustment of the springs. These springs, which were attached to lugs vulcanized to each side of the plate, were made of No. 22-gauge piano-wire, in the form of a right angle, with two small coils at the angle. These were placed in the lugs on the buccal side of the plate, and a German-silver wire passed around the front through the lugs made to hold it in position, being attached to the springs on either side. A large U-shaped spring was then made for the posterior part of the plate, of the same kind of wire, but No. 18 in size. This spring was formed to fit close to the plate, that it might not interfere with the tongue. A very slight amount of tension was put upon these springs at first, and the plate was put in position in the mouth. It was worn constantly for about four weeks, except as it was removed every day for cleansing and re-adjustment. The width of the fissure in the alveolar process in the case to which this was applied was seven-thirty-seconds of an inch. After wearing the plate for three weeks, the edges of the process were in actual contact.

After bringing the edges of the cleft together, an operation was done to unite the palatal processes and to correct the curve of the arch. A fracture was made in the line of the right premaxillary suture, and the premaxillary bones thus loosened were placed in their proper places. This brought the incisor teeth into the arch.

The contiguous surfaces were then freshened and secured with a silver ligature. To prevent displacement of the parts until a hard-rubber splint could be made, the parts were invested in soft modeling compound, over the surface of which iodoform was sprinkled. The rubber splint was frequently perforated to facilitate cleansing, while, at the same time, it was made strong enough to securely hold the parts in place until union had occurred. For ten days after the operation, the mouth was washed every two hours with permanganate of potassium and calendula, to prevent infection.

The result of the above operation was a perfect curve to the arch and a complete union of the anterior third of the maxilla and the alveolar process. An operation was then made on the lip, with very satisfactory results.

GUMS.

A case of excessive hypertrophy of the gums is reported by Hisey.⁸⁰⁵ The patient, a well-developed, bright, intelligent, well-educated Hebrew boy, aged 15 years, of good family history, presented himself for treatment of enlarged gums, which were growing rapidly, producing considerable deformity of the mouth, greatly interfering with speech and mastication. The growth extended in an unbroken line the entire length of the alveolar border of both upper and lower jaws, also dipping into the floor and roof of the mouth, internally and externally, to the extent of three-fourths to seven-eighths inch, where it ended abruptly, being more pronounced upon the buccal surface. He had a few deciduous teeth, which erupted very late, were few in number, very rudimentary, were soon loose and shed. Of the permanent teeth, he had but six visible,—one superior left central incisor, three inferior bicuspids, and two molars, and they are completely imbedded in the morbid growth, which is a dense, inelastic, firm, unyielding tissue, having the natural rosy hue of the normal gum. There is no doubt that the hypertrophy was present at birth. The case was operated upon by Garretson with good result.

CHEEKS.

An interesting thesis on the adenites of the cheek is contributed by P. Vigier.¹⁰⁰ Poncet had insisted long ago that there were lymphatic glands imbedded normally in the cheek, which had escaped the attention of anatomists. He therefore suggested a special research on this subject to the author. The dissection of Jaboulay demonstrated the existence of glands in the supra-maxillary region, following the course of the facial vessels. From a clinical stand-point, Vigier classifies the glands of the face into superficial (masseteric, commissural, and infra-orbital) and deep, which are situated under the aponeurosis of the buccinator (Debierre). These glands are rarely exposed by dissection, and are only made visible by pathological conditions. They may be the seat of acute and chronic glandular inflammations. The more-common varieties are phlegmonous adenites of dental origin, especially the upper-jaw teeth. All causes which tend to produce changes in the lymphatics elsewhere can here give rise to enlargement. The ganglia most frequently affected are those of the supra- and infra- labio-commis-

sural group; they are rarely larger than a small nut. The differential diagnosis between simple adenitis of this group and small sebaceous cysts—lipomata, buccal adenomata, and subcutaneous gummata and angioma—is at times quite difficult, as shown by twelve observations collected by the author. Cancerous adenitis of this group of glands may be observed as a result of infection from the lids, lips, and cheeks; it is comparatively rare, but should be remembered because of their importance in favoring recurrence.

AURICLE.

Matas⁹ reports a case of "large, cavernous angioma," involving the integument of an entire auricle, successfully treated by dissection, free resection of diseased tissue and ligation of the afferent trunks *in situ* by a special method. In reviewing the history of this case, the salient features that are most noticeable are:—

1. The sudden transformation of an innocent nævoid spot into a voluminous and rapidly-growing angioma.
2. The extent of the disease, which involved the entire tegumentary covering of the auricle.
3. The preponderance of arteriectasis which existed in the morbid tissues.
4. The participation of the entire thickness of the skin in the angiomatous process.
5. The hypertrophy of the cartilage through hypernutrition.

The therapeutic lessons to be derived from the study of the case are:—

1. The advantage of early and radical interference in all nævoid diseases, before the advent of the later and more formidable erectile-tissue stage.
2. The danger of ulceration or hæmorrhage from neglecting advanced cavernous angioma, an urgent condition that interferes with the choice of therapeutic methods when ulceration has been established.
3. The inability of ligature of the external carotid to control permanently the circulation of the auricle, on account of the early re-establishment of the collateral circulation through the opposite carotid, and corresponding subclavian branches.
4. The inability of interstitial or parenchymatous injections

of carbolic acid to control extensive cavernous angioma in which the arterial preponderates over the venous ectasis.

5. The facility with which prolonged local anaesthesia with cocaine and haemostasis of the auricle may be obtained by means of elastic constriction, applied by the method adopted in this case.

6. The possibility of permanently arresting the progress of advanced cavernous angioma of the auricle by ligating the afferent arteries *in situ*, provided this be done deliberately under the prophylactic haemostasis of elastic constriction.

7. In all cases of cutaneous angioma, as in the present instance, in which the skin is diseased throughout, it is utterly impossible to restore the parts to their normal appearance without complete excision. The progress of the disease may be arrested, but the cosmetic result will remain poor.

8. The entire cartilaginous frame-work of the auricle may be bared of all tegumentary covering and fully resected without seriously compromising its vitality, provided the connection of the concha with the temporal auditory cartilage is maintained.

Finally, profiting by the light of present experience, if called again to operate on this or a similar case, the author would proceed as follows:—

1. Ligate the external carotid on the corresponding side.

2. After waiting for the wound of ligation to heal, and before the collateral circulation is re-established, anaesthetize the patient and control the circulation of the ear by the method previously described, and resect the whole angiomatic skin, leaving only those areas in which the normal tissues remain. If necessary, remove the whole cutaneous envelope of the auricle, and cover the jaw surface immediately with Thiersch grafts.

3. Before applying grafts, ligate all afferent trunks in the auricular skin-stumps, before and after renewing the elastic constrictor.

4. Dress the wound with a typical aseptic dressing. The advantages of such a procedure are obvious. Not only would the diseased area be radically removed, and thus the possibility of recurrence eliminated, but the cosmetic result would be much more satisfactory.

Gifford, of Omaha,¹⁰⁸ refers to the application of Thiersch flaps in eye and ear surgery. The ingenious methods of utilizing

these grafts for the correction of entropium and in ear surgery, to prevent cicatricial atresia of the meatus, are valuable, and should engage the attention of specialists.

SURGICAL MYCOSES.

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SURGICAL TUBERCULOSIS.

Lannelongue's method of sclerogenesis (described in last two issues of the ANNUAL) has received considerable notice during the last year. Coudray, of Paris, presented to the French Surgical Congress ⁹¹ _{May 10} observations upon 80 cases in which the treatment had been used, as follow: Large joints, 49; comprising knee-joints, 23; hip-joint, 10; ankle, 8; elbow, 5; wrist, 3; Pott's disease, 5; tarsal osteitis, 7; phalanges of the foot and hand, 7; tubercular adenitis, 12; subcutaneous abscesses, 2; testicle, 1. Relative to the results obtained, his conclusions are about the same as last year; that is, rather reserved as to the permanent character of the improvement. Lannelongue himself has apparently met with more encouraging results, ¹⁴ _{Aug.}, as demonstrated to a committee of the Congress for Tuberculosis. Several cases of tubercular hip- and knee-joint disease were presented, which had resulted in an absolute cure. The sclerogenic method was also applied to cases of congenital dislocation of the hip-joint, resulting in a bony formation, which acted as a good substitute for a new joint-cavity.

Jeannel ¹⁰⁰ _{June 1}, has indicated a new method of sclerogenesis by boiling water, the advantages of which are as follow: (1) it might destroy the bacillus, the tubercles, and fungosities in the scalded tissues; (2) it might, while killing the bacillus, decompose the toxins and destroy the anatomical elements in all the tissues heated above 80° C. (176° F.); (3) it might attenuate the bacillus without killing it in tissues heated between 42° C. (107.6° F.) and 80° C. (176° F.), while it might destroy the anatomical elements; (4) it might attenuate the virulence of the bacillus without destroying the anatomical elements in tissues heated between 40° C. (104° F.) and 42° C. (107.6° F.). He reports good results in 4 cases of osteo-arthritis where amputation was indicated, and where

scraping and cauterization with thermo-cautery had failed; in 7 cases of tubercular osteo-arthritis and cold abscesses not previously treated, where scraping was resorted to and followed by the use of boiling water. The method is applied as follows: Having scraped the wound, a current of boiling water is made to pass into it by means of the irrigator, taking care that the skin be protected by means of sterilized towels. The wound takes a grayish appearance, resulting from the albumen coagulation on the surface. It is then packed with gauze. The subsequent day considerable oozing takes place, which finally diminishes as the wound assumes a healthier appearance.

Nélaton¹⁴, speaks of the good results obtained, in tubercular adenitis of the neck, from the use of injections of camphorated naphthol; he states, however, that when the tuberculous glands are deeply situated and are accompanied by a fistula, the results obtained are not so marked as when the glands are soft and more superficial. Moty¹⁴, uses camphorated naphthol (1) for dressings; (2) in cases of recurrence after excision; (3) in cutaneous gummatæ of the face; (4) in subjects with an inoperable tuberculous mass. In the last cases the injections gave a result not obtainable by any other method.

Lejars³¹, reports a case of primitive muscular tuberculosis which spread to the synovial sheath of the tendons. This patient had a white swelling of the knee which necessitated an amputation. Later, a tumor appeared on the forearm, near the wrist, having all the appearance of a tubercular synovitis. The patient died, and an autopsy revealed a cavity in the muscular region of the forearm filled with tubercular nodes, and from which infection had evidently spread below. The interesting points are: (1) that the muscular region had first been affected; (2) the determination of the manner in which this had occurred.

Courtin¹, reports his results in the treatment of tuberculous lymphadenitis by injections of a mixture of 1 part of beta-naphthol and camphor and 4 parts of 60° alcohol. The pain caused is but slight and disappears in a few days. There is moderate swelling for two or three days.

Calot^{3, 96}, claims that cold abscesses, even the most voluminous and chronic, are curable in eight days, provided that they are accessible, by means of an operative procedure in which, after

entire removal of the diseased tissue, immediate union is sought for. If this be not obtained, a recurrence is nearly certain or a fistula may persist. To insure success, the adjoining tissues must have sufficient vitality; the walls of the abscess must not only be removed, but the surrounding tissues must be excised deep down into healthy parts. All drainage must be suppressed, for the drain renders re-infection almost certain. Even when it is aseptic, it will be liable to leave a fistula that will persist indefinitely. The superficial sutures must not leave a single space, and compression must be equal, energetic, and methodic. Old and extensive abscesses are especially amenable to this method. The writer has thus treated with success an extensive cold abscess that had been treated in vain for nearly two years by other methods, and which contained over three quarts (litres) of pus.

ABSCESS.

Nélaton²⁸ describes a case of very singular form of suppuration observed by Linon, of Versailles, occurring in the submaxillary region. There was yellowness of the skin, pain, and trismus. Incision was made in the middle of the throat, above the hyoid bone, which gave exit to no pus, but to some sanious fluid. A loose, decayed wisdom-tooth having been removed, the symptoms nearly disappeared, but on the sixth day returned, with high temperature. Crepitation and fluctuation were detected on the right side, just above the clavicle. The site was incised and the wound dilated by dressing-forceps, but no pus was seen until the next day, when a large quantity appeared, with complete relief to the patient. At the end of a month a large collection of pus was found behind the sternum; so the manubrium was disarticulated, bent forward, and a large abscess-cavity found and washed out. The recovery of the patient was extremely tedious.

Brousses and Brault²⁹ describe a space, of prismatic form, situated below the back part of the tongue, and bounded in front by the hyoglossal and thyro-hyoid membranes, and behind by the anterior surface of the lower and attached portion of the epiglottis. The upper boundary is formed by two membranous layers, one consisting of the lingual mucous membrane, the other and deeper layer of fibrous tissue. This cavity, it is stated, is divided into two lateral halves by a membranous septum, which seems to be an extension

downward of the median glosso-epiglottidean ligament. This inclosed and divided space, which is called by the authors the glosso-thyro-epiglottidean cavity, may, it is stated, become inflamed, and thus give rise to diffused phlegmon of the neck. Phlegmon, when developed in this cavity, presents, in its early stages, a special set of symptoms, which may enable the surgeon to form a precise diagnosis. These characteristic symptoms, which in the course of the affection become associated with intense dysphagia, dyspnœa, and aphonia, are: (1) spinal localization of the swelling and tenderness in the portion of the neck between the supra-hyoid and infra-hyoid regions; (2) a "woody" consistence of the swelling, due to the fact that it is closely and deeply limited by membranous walls capable of withstanding tension; (3) slight infiltration in the glosso-epiglottidean region, whilst the surgeon is unable to feel any elevation there, or any collection of effusion in process of formation; (4) absolute integrity of the root of the tongue and of the pharynx. This form of phlegmon is a serious one, as asphyxia is threatened in an early stage of the affection, and septic poisoning at a later period. The treatment should consist, when the inflammation is still limited to the cavity, in thyro-hyoid laryngotomy, and afterward, when the swelling has spread above the hyoid bone, and can hardly be distinguished from that of deep-seated phlegmon in this region, in a median incision carried between the genio-hyoid muscles to the base of the tongue.

ANTHRAX.

Klein²², received a patient into the Rudolf Hospital who complained of great pain in all his joints, but in whom no abnormal condition of the joints could be observed. On the left side of the neck there was a soft, elevated swelling about the size of a six-pence, somewhat depressed in the centre, which was diagnosed at first as a simple pustule. On removing a portion for microscopic confirmation it was found to contain the anthrax bacilli. Cultivations further proved the malignant character. The whole pustule was speedily extirpated by the knife, along with all the lymphatic glands under the clavicle. Recovery was complete. In his remarks on the case, Klein contended that many cases were reported as anthrax which seemed to him not to be anthrax at all; and he thought that the finding of the microbe and its cultivation would

be the safest course in these doubtful cases. The treatment recommended was no less varied. It appeared to him that the quantity of germ-poison would materially affect the treatment. It is advisable in all cases to remove the foci of infection as early as recognized. In his experiments with the cultures he found each generation becoming weaker; he concludes that the introduction into man is probably by spores.

Martin⁹⁰ has already recorded experiments which show "that both in a cultivating medium and in the bodies of animals the bacillus anthracis produces from proteids two classes of poisonous products," an albumose and an alkaloidal base, which he calls the "anthrax base." The latter is "the active agent in producing death," and was found in considerable quantities in the spleen and blood of an infected sheep.

Golden¹⁷⁰ reports a case in which hydrogen peroxide was employed in the treatment of carbuncle. Parenchymatous injections (with an ordinary hypodermatic syringe) of the peroxide (m xxv to xxx —1.6 to 2 grammes) were made twice a day. In from six to eight hours new openings formed, giving exit to considerable quantities of liquefied core and relieving tension. The writer believes the new drain-channels to be due to the evolution of the gas (from oxidation within the core), which is forced through the points of least resistance. It is, in his opinion, superior to carbolic acid and "a very useful agent in the treatment of this troublesome affection."

Hallopeau²⁴ advocates the use of carbolic oil for the treatment of anthrax. Carbolic acid is first dissolved in alcohol and a 10-per-cent. solution of this is made with oil, which has the property of removing the irritating action of the carbolic acid. Glycerin has the same effect. The surface of the anthrax is bathed with this carbolic oil, and if necessary a poultice is impregnated with it. The depths of the ulceration must be reached by the oil. In twenty-four hours necrosed pieces of tissue fall off and the parts assume a healthier appearance. The neighboring structures might also be bathed with the carbolic oil, so as to prevent the extension of the affection. Some of the worst cases are said to have yielded to this treatment within three days.

Diatroptoff²⁵ has succeeded in demonstrating the anthrax bacilli in the mud taken from the bottom of a well near Odessa.

An epidemic of anthrax broke out on land where animals—flocks of sheep—were pastured ; several of the dead sheep were buried and the others removed to another pen several kilometres distant, and having a special watering pond. The infected pen was carefully disinfected, the walls being washed with sublimate, the earth raised to a depth of twenty-five centimetres and replaced by other soil. On their return to the disinfected pen, a sheep which had been perfectly well in the second pen was attacked by anthrax. A new change, with a second disinfectant, was followed by the recurrence of the disease on their return to the former pen. The proprietor at last noticed that the anthrax only commenced when the water of this well was used ; this water avoided by the farm people on account of its brackish taste. When the well was filled up the epidemic ceased. Bacteriological examinations of the water itself, and inoculations of mice therewith, gave negative results. The author sent for samples of the soil of the pen, and water from the well from which the suspected water was taken. No anthrax bacilli were found in the soil of the pen, but from the mud bacilli were obtained which killed rabbits and mice, the bodies presenting post-mortem appearance of anthrax. Cultures from the blood left no doubt as to the nature of these bacilli.

Murisier¹⁹⁷ relates the history of an epidemic originating from anthrax. About 200 persons fell sick after eating meat from a cow quartered by a butcher who had slaughtered an ox afflicted with anthrax and had not disinfected his instruments ; four weeks after this, twenty-five persons were attacked by the disease, all with the following symptoms : vomiting, abundant mucous diarrhoea, of the riziform type ; gastralgia, rachialgia, cramps in extremities ; sudden elevation of temperature, then lowering below normal ; weakness, and stupor. One died two days after the attack. Autopsy revealed flaccid heart in diastole, gastro-intestinal mucous membrane greatly congested, Peyer's patches and follicles greatly hypertrophied, kidneys congested, spleen small and hard, no ecchymosis, blood fluid and black, and all the tissues of a brick color. Certain patients were at that time affected by microscopic diseases, such as bone-felon, lymphangitis, abscess of breast, and certain symptoms of pulmonary tuberculosis. These reacted, under the effect of their intoxication, after the same manner with tuberculous tissues or from injection of Koch's lymph. The cicatrices of the

bone-felon, abscess of breast, and lymphangitis became greatly congested and painful, tuberculosis spread, and there were haemoptysis, dullness on percussion, etc. There was no doubt but that the epidemic was caused by the ptomaine of the anthrax bacilli.

ACTINOMYCOSIS.

Poncet²¹¹,² v.11, p.480; Feb. 4 relates the case of a man who, a few days after the removal of a broken tooth, was attacked by suppurating submaxillary adenitis. The suppuration increased gradually, attacking the cheek and then escaping through the ear and right nostril. A fistula was formed in the temporal region. Afterward pulmonary symptoms arose and the general condition became very unfavorable. On pressure of the fistulous tracts, a sanguineopurulent discharge escaped, containing small, yellowish granules, which exhibited under the microscope the club-shaped bodies characteristic of actinomycosis. Similar cultures were observed in the sputa, though the signs on auscultation much resembled those of pulmonary tuberculosis. The extent of the disease in the jaws and scalp, together with the lung complication, seemed to contraindicate surgical interference, and palliative measures only were adopted.

Schlange,¹⁸ May 15 discussing the prognosis of actinomycosis, concludes as follows, after an analysis of sixty cases: When the disease involves the head and neck, except in a few cases in which the base of the skull is invaded, the course is favorable, recovery taking place in from three to nine months. It is exceptional for the fistula to persist, or to form anew, after the lapse of a year. Pulmonary actinomycosis, heretofore considered fatal, may terminate in recovery. The prognosis of actinomycosis is the more favorable, as the anterior abdominal wall is involved and the retroperitoneal structures escape. Retroperitoneal extension of the disease renders unfavorable the local conditions, facilitating the expulsion of the fungus. Death usually results from amyloid degeneration and wasting. If actinomycosis present pyæmic manifestations, a fatal termination is to be expected, as a number of vital organs are likely to be involved. Actinomycosis may pursue a chronic course, continuing thirteen years or longer, if functionally important organs be not involved, as when the process confines itself to the connective tissue about the spinal column.

Park,¹⁷⁰ Choux,²¹² Dubreuilh,¹⁸⁸ Durham,²², and others relate interesting cases of human actinomycosis, and lay special stress upon the clinical appearance of the disease. In each the peculiar fungus was detected under the microscope.

Treatment.—Potassium iodide has again been highly recommended as a cure for this affection. Meunier⁸⁰ observed a case where the disease appeared in the form of a dense phlegmon attacking the cervical region. Before ascertaining the true nature of the tumor iodide of potassium was administered, 25 grains (1.6 grammes) a day; the result of this treatment was the cure of the patient; so that Meunier agrees with Thomassen in the belief that the iodide is a specific against the disease. Van Itersen¹⁰⁶⁹ applied, in two cases of actinomycosis, the potassium-iodide treatment as recommended by Thomassen in 1885. The first case was that of a sea-captain, the buccal cavity being affected, the disease extending to the submaxillary region. The patient was given daily doses of potassium iodide, 22 to 30 grains (1.43 to 2 grammes). After a time all manifestations disappeared, save a single cicatrix on the margin of the jaw. Eight ounces (248 grammes) of potassium iodide had been consumed. The other patient, a tailor, after prolonged constipation, presented a hard, painful swelling in the cæcal region. Incision revealed tense membranes containing but little pus. In several weeks the wound closed. It opened spontaneously after the return of the hardness and pain. The scanty pus contained yellow grains, which on examination proved characteristic of the ray-fungus. Under potassium iodide, 15 grains (1 gramme) daily, complete cure was obtained in four weeks, there being no relapse. Others, among whom are Buzzi and Galli-Valerio,⁵⁸⁹ have met with the same success, the treatment proving most efficacious when decided iodism was produced.

GLANDERS.

Buchanan,^{2,3} Destrée,⁸⁶⁸ Sheddan,¹⁰¹ Williams,¹⁰¹ and Bayard Holmes⁶¹ describe cases of glanders occurring in the human subject. Holmes concludes that glanders is allied to the chronic and infectious diseases, and that its normal host is probably one of the domestic animals; that the bacillus is a parasite of its host; that it resembles morphologically the other bacterial parasites that produce chronic diseases in man, especially tuberculosis and leprosy;

that the disease is rare in man; that it presents itself in one of two forms,—one acute, with a rapidly fatal termination, as a rule, inside of two or three months at the farthest; the other chronic, from which the patient may recover after one, two, four, or five years of disease; and that the occurrence of glanders is usually due to the association of man with domestic animals or persons suffering from the disease. In the chronic form at least twenty different foci of development have been treated within two and one-half years. These foci were opened, scraped, and cauterized with the thermo-cautery.

Semmer and Vladinirow⁹⁹⁶ state that the measures used for the diagnosis of pulmonary and nasal glanders are not satisfactory. The surest means is to inoculate some of the morbid products into cats and guinea-pigs, and to make control experiments with cultures on potato. If the animal dies of glanders, and the culture consists of the malleus bacillus, there is no longer any doubt about the disease, but this as a diagnostic means is not always easy. Helman has found a simpler means, in an extract of the malleus bacillus, possessing a specific action upon horses. This extract, called mallein, produces, on horses attacked with glanders, an elevation of temperature of from 0.5° to 3° C. (0.9° to 5.4° F.), and forms, at the seat of inoculation, a tumor which increases rapidly for two or three days and then disappears. The author's experiments prove that we are in the presence of glanders whenever the above symptoms appear in the horse after the injection of mallein. This diagnostic procedure has already been adopted in the German army.

Schneidemuhl² gives an account of recent researches upon sero-therapeutics in glanders. The injection of the serum of horses affected with glanders causes less rise of temperature in animals suffering from the disease than the injection of mallein. Serum has been used for protective and curative, as well as for diagnostic, purposes. Hell obtained, from horses which had recently passed through an attack of glanders, blood-serum which he sterilized and injected in doses of 40, rarely 80 grammes ($1\frac{1}{4}$ to $2\frac{1}{2}$ ounces), horses receiving in three weeks 320 grammes. In one regiment 54 horses were so treated. In one squadron 12 horses were injected, and after this no more cases of pulmonary glanders appeared. In cases of horses already affected, the disease was

brought to a stand-still in three days. He adds that repeated injections are necessary for protection, and for cure in early cases the serum must not be used too sparingly. Hell's opinion, as well as Toepper's, is that the serum of horses which have had glanders has both protective and curative properties against the disease. For the latter purpose 100 grammes ($3\frac{1}{2}$ ounces), repeated two or three times, are required.

Mallein, a product obtained by extracting cultures of the glanders bacillus with glycerin, is sent out from the Pasteur Institute of Paris⁵²¹ in two forms: The first of these, or diluted mallein, is a transparent, straw-colored liquid retaining its activity for about a fortnight, if the tubes are kept in the dark and unopened; the second form is the concentrated mallein, a thicker fluid, and retaining its activity for some months. Before used it must be reduced to the condition of the diluted mallein by adding to it nine times its volume of the $\frac{1}{2}$ -per-cent. solution of carbolic acid in water.

CYSTS.

Haward²² describes a cyst of the breast surrounded by deposit of sarcoma. The patient, aged 59, suffered from a tumor of the breast, growing for nine years, and which had occasioned a discharge from the nipple; recently discharge had ceased, and the swelling was diagnosed as cystic increase. After a short time it became red and tense, having all the appearances of a cyst which had undergone suppuration. The tumor was cut into, and some thick pus let out. On the finger being introduced into the cavity, a hard deposit was discovered all around; so that it was thought better to remove the whole breast, and subsequently, on dissection, the deposit was found to have the appearance of sarcoma. Haward remarked that the function of the breast having ceased in a woman of the patient's age, it was considered best to remove it in any case, considering the doubtful character of the growth.

Kummer¹⁹⁷ relates a case of a boy, 10 years old, with a dermoid cyst in the thyro-hyoid region. It was extirpated, and there was absolute healing of the wound by first intention after forty-eight hours. The tumor presented most interesting histological conditions, consisting mainly of epithelial cells in its interior. In the middle coat the thickened wall of the cyst also presented epi-

thelial cells of various ages, some having undergone atheromatous changes.

Lucas²²,_{Mars.} presents a case of cystic tumor of the breast, with malignant deposit. The complete removal of the breast was performed, and the tumor, which on clinical examination appeared benign, showed an area of malignant development. Lucas insists on the removal, on this account, of all tumors, however benign they may at first appear clinically. Delbet and Brissaud,³¹,_{Mars.} in an interesting discussion of mammary tumors, reach the same conclusion.

Guterbock²²,_{Mars.} reports a case of echinococcus of the neck. The patient, a young woman aged 19, developed a non-movable, reddened tumor under the angle of the jaw. Under the supposition that it was a caseating lymph-gland, an incision was made, when a quantity of pus escaped. On enlarging the opening, an echinococcus came into view. The capsule of the parasite was removed from the substance of the sterno-cleido-mastoid muscle. Recovery was uninterrupted. This condition is rare, there being only twenty-six cases in the literature of the subject, and nine cases of the disease in the thyroid gland. It occurred mainly in young people, and females were affected more frequently than males. The left side was most frequently the site. The affection was generally mistaken for a serous cyst. As regards treatment, incision was made 14 times; 10 patients recovered, and 3 died of haemorrhage from erosion of large blood-vessels. In 1 case the result was not known. In 6 cases in which the capsule was excised, recovery was uninterrupted; 4 cases were treated by puncture; 2 by injection of iodine and drainage. Of 24 cases treated by operation, 18 recovered, 3 died; in 3 the result was not known.

Karewski,¹¹,_{Mars.} Parker,¹³¹,_{Jans.} and Schlangen,⁴¹,_{Mars.} discuss the formation of congenital fistula of the neck, of branchial origin. Sometimes these fistulae resemble swollen glands; sometimes there is internal opening in the tonsil or pharyngeal wall; and all bear some relation to the glosso-pharyngeal nerve. As to treatment, deep dermoids must always be extirpated, as they may be transformed into cancers. Operation upon the fistula is only indicated when they cause severe symptoms, such as dyspnoea and difficulty in swallowing. Radical cure is only impossible if nothing remain of the

fistula. Complete fistulæ are all cured after first operation; incomplete often require secondary operation. Five cases of the former and seven of the latter are reported.

Buckdingl.²², observed the case of a young woman, 23 years old, who for three weeks had a depression and opening on the left side, about the size of a pin's head, at the angle of the jaw. The swelling extended to the parotid and the external ear, causing great pain. It broke and discharged a large quantity of pus. On closing and inspecting the abscess, it was found that a sound could be passed through the external ear, and that the case was one of branchial fistula, in which the secretion had become inspissated, producing the abscess. To split up the fistula would leave a large scar; besides, cutting the facial branches would produce paralysis. The best treatment, in his opinion, would be a stimulating injection to destroy the epithelium and finally close it. He determined, therefore, to use strong solution of tincture of iodine, as only a strong irritant would produce sufficient inflammation to cause a closure of the fistula.

CARCINOMA.

Etiology.—Brunon,⁸¹ from an exhaustive inquest on the origin of cancer, concludes, from the testimony of the majority of physicians in Normandy, that it is contagious to a certain extent; that, compared with tuberculosis, it is less frequent in the country than tuberculosis; that heredity, from the present state of our knowledge, appears to be the most frequent cause; that the influence of water and cider, though quite possibly a cause, has not as yet distinctly been proven to be such.

Metschnikoff²³ strongly inclines to the supposition that the parasites or sporozoa found in the coccidian disease of rabbits bear a great analogy to coccidia found in human tumors. A further stage in the history of the parasites is described, their development being traced in the nucleus of the cancer-cell. Metschnikoff says there are hardly any grounds for supposing that cancer is a contagious disease, whereas there is strong clinical evidence to show that, like other coccidial diseases, it is of miasmatic origin. With regard to the formation of spores, or to the mode of reproduction of these organisms, Metschnikoff can give no clew, and it would appear that these organisms reproduce themselves

outside the body only, and have by no means the different characteristics present in true spores. It is evident that we have come to the limit of what can be learned by simple microscopical examination, and that farther experimentation must be conducted on new principles, for that fresh human cancer is harmless to animals has been proven; that cancer organisms, however, which have had an opportunity of multiplying outside of the body, will prove equally harmless, is a question upon which no one can give a definite opinion at present.

Soudakewitch¹¹² combats the idea of Virchow that the parasites described by recent observers have little to do with the etiology of cancer, and maintains that the structures he describes in the cancer-cells are true parasites, and distinguishable by certain characteristics from various degenerated products and altered cells. In one hundred and ten cases which he has studied, he constantly obtained the same results, and thinks that the young parasite passes into the substance of the cell, grows slowly, becoming surrounded by a more and more distinct capsule. The nucleus is pushed to one side and flattened about the parasite. The protoplasm of the cell is distended and becomes homogeneous. At last only a thin membrane surrounding the parasite is all that remains of it. When this is broken through the parasite is set free, and its protoplasm divides into smaller bodies—spores?—which make their way into the neighboring cells, where the process recommences; so that a single cancer-cell may give rise to contamination of many around it. The products of metabolism are also thought to have some influence in producing the growth.

The same author² gives the following as the principal methods employed by him in this work: 1. Fixation in osmic acid, 1 per cent. (twenty-four hours), with subsequent hardening in Müller's fluid, followed by alcohols of progressive strength. For staining sections, cut as far as possible without paraffin or celloidin. Thoroughly ripe hæmatoxylin—Ranvier (15 to 30 min. in dil. sol.) —was used. 2. Fixation in Flemming's fluid; for staining, sat. aq. sol. of safranin (one to four days), decolorizing as usual with acid alcohol. 3. Fixation in Flemming's fluid or alcohol; sections stained in sat. aniline-water, methyl-blue sol. (twenty-four hours); decolorized in 97-per-cent. alcohol. The characteristics of the parasites are variously brought out by these methods, one of which

may succeed where the others fail. The second appears to give the most-constant results. In some cases none of these methods were found satisfactory by the author—a fact pointing to the conclusion that the carcinoma sporozoa belong to different species. By examining scraped-off carcinomatous cells in a 0.6-per-cent. sodium-chloride solution, the living parasites may sometimes be very distinctly seen.

Török, of Budapest,²⁴⁵ considers that the sporozoa of cancer hitherto described are the products of degeneration of the nucleus of the normal or altered migratory cells of the blood. He has observed, in different forms of chromatic degeneration, that the nucleus inclosed rounded, spherical, or fusiform bodies, which colored intensely and, after disappearance of the enveloping membrane, mixed freely with the pale or brilliant cells of cancer. Other psoroform products result from the swelling-up of certain cancer-cells, in consequence of various conditions (hyaline transformation, hydropic degeneration). The author thinks that the sporocysts which have been described are derived from altered epidermic globes and giant-cells.

Joseph Coats,²⁴⁶ while asserting that cancer does not correspond to diseases due to bacteria, believes that it remains to be seen whether organisms at the lower extremity of animal life might not induce such tissue-growth as occurred in cancer. It is possible that the greater affinity of animal cells for each other might produce such an effect. Herbert Snow,²⁴⁷ Galloway,²⁴⁸ and others have expressed like views as to the parasitic origin of cancer.

Foà²⁴⁹ finds that the parasites differ a little according to the state of their development and according to the phase which predominates in a given case. According to these later observations, the parasite consists of a body which in the early stages is small and surrounded by a halo of protoplasm which extends to the periphery, where it ends in festoons and where it is inclosed in a capsule. In the course of development the central corpuscle grows larger and the protoplasm surrounding it either disappears or becomes very thin and transparent; so that one gets the idea of a cyst limited by a capsule with a central body more or less large, homogeneous, refractive, from the periphery of which stretch a few filaments to the external capsule. The capsule often presents a fine, regular striation. In the course of development the central

corpuscle constantly increases and becomes a large lobulated mass, from which a number of homogeneous, highly refractive, smaller corpuscles become detached. Finally, the capsule contains nothing but these smaller bodies. When the parasite is young it stains readily with hæmatoxylin, but at a later stage the central corpuscle stains only with eosin or orange, and the same may be said of the smaller derived bodies. The author infers, from their mode of development, that these central bodies are coccidia, and that the derived bodies are spores. These latter penetrate into the substance of fresh cancer-cells. There they are just recognizable as homogeneous refractive bodies with a surrounding clear sheath. There are cancers in which no further stages of development can be made out, and in these cases any one who had not become familiar with the appearances in other cases would have some difficulty in determining their nature. Hæmatoxylin colors only the sheath of the young parasites, or a substance—perhaps mucus—which in these cases takes the place of the capsule, and of which the remains are often found even when the sporocyst is developed. The staining method employed is as follows: The tissue is hardened in Hermann's fluid, and the sections are stained with a mixture of hæmatoxylin and saffranin, and afterward with a weak solution of orange. The nuclei then become stained by the saffranin, the protoplasm by the orange, and the parasites proper by the hæmatoxylin. They can thus be quite easily differentiated. Up to the present time Foà has never found the parasites in the nuclei, but always in the protoplasm of the cancer-cells.

Treatment.—Adamkiewicz,¹¹ notwithstanding the contradictions of his colleagues in Vienna, always affirms that his "cancroin" has an influence on cancers. He now refers to some observations by other authors agreeing with his own views. Of these cases were: (1, 2) carcinoma labii inferioris; (4) carcinoma linguæ in a physician, who wrote that he believed it to be undeniable that the tumor and the swollen glands suffered a reaction, and that after interruption of the treatment the progress of the disease was diminished; (5) carcinoma mammæ. We will only refer to Case 3, viz., carcinoma laryngis, as to which Piniazek reported: Carcinomatous infiltration of the ary-epiglottic fold, arytenoid cartilage, and ventricular band of the right side, causing stenosis of the glottis; no inflammatory condition. After injection of cancroin, inflam-

matory swelling of the diseased parts followed, with increase of the stenosis. With further injections fresh inflammations occurred, followed by severe suppuration of the larynx. Piniazek says that he never saw, either spontaneously or as an effect of treatment, similar suppurations. The author concludes that the treatment has a real effect on cancroids.

Billroth,¹⁴ reported a case of carcinoma which was spontaneously transformed into a cicatrix. The woman, 50 years of age, seven years before had a nodule in the breast, which developed progressively to the size of an apple. The breast became black, dry, and almost mummified. For two years it diminished in volume, and at the time of report there was nothing left but a cicatrix. Billroth also showed a series of pictures representing analogous processes of atrophy which had taken place in other neoplasms. He says he has never observed this in sarcoma.

Weir,² holds that in removing the breast for carcinoma the surgeon should always explore the space called by the Germans "Mohrenheim's," which is situated high up in the axilla, and just below the clavicle. This exploration, it is stated, is best accomplished by separating with the fingers the cellular plane between the pectoralis major and pectoralis minor muscles until the clavicle is felt, and then, by flexing the arm somewhat on the chest, the first-mentioned muscle is lifted up by the fingers of an assistant, or by a retractor. In this way the space which contains the axillary vessels and a small quantity of fat is readily exposed to view and to palpation. In it will be found, if enlarged glands have been previously met with in the axillary fat, one or more small cancerous glands. With the fingers or the end of a pair of curved, blunt-ended scissors,—not by cutting,—this fat can be entirely removed. If any difficulty occur in doing this, a finger passed beneath the pectoralis minor muscle can push this fat sufficiently forward to bring it entirely within the control of the surgeon. A systematic examination of this region will, the author holds, afford additional security to the patient. The separation of the two pectoral muscles, it is stated, often reveals a diseased lymph-vessel running along the cephalic vein.

Rupprecht,² insists on the necessity of a radical removal of the inguinal glands in cases of carcinoma of the umbilicus, the penis, the vulva, the anus, and the lower extremity, and also in

many instances of cutaneous sarcoma on the thigh. This practice he has carried out during the past ten years in every case of cancer in the regions just mentioned, in which a prolonged operation was not contra-indicated by debility of the patient or advanced age. In the groin, as in the armpit, in cases of cancer of the breast, the glands, it is held, should be removed, even though not appreciably enlarged. In cases of cancer, either on the right or the left side, only the corresponding inguinal glands are removed; but in cases in which the primary disease is seated in the median line of the body, the author clears out both groins. The operation, like that for removal of the axillary glands, is an extensive one. A skin incision is made from the spine of the pubes to the antero-superior spine of the ilium, and a second is carried downward from the middle of this along the course of the femoral vessels. The skin is then separated from the subjacent soft parts as far as the aponeurosis of the external oblique muscle above, the fascia lata on the outer side, and the adductor muscles on the inner side. The triangular mass of fat and glands thus circumscribed is then carefully detached from the deep fascia by using, as far as possible, a blunt instrument. In the course of the dissection it is necessary to divide the saphenous vein. It is often necessary to remove the fat and glands from the fossa ovalis after division of the falciform process, and also to reach deep-seated glands by incising Poupart's ligament. In every case the femoral vessels are more or less freely exposed. The author speaks favorably of the results of this operation, and states that it has never been fatal in his practice, nor has it been followed by serious haemorrhage.

D'Ambrosio^{2,17} reports the following case: A woman, about 50 years of age, had a tumor in each breast. That on the right side, which had almost entirely replaced the mammary gland, was ulcerated, and haemorrhage was frequent. Numerous secondary nodules were scattered around the principal mass, giving rise to the appearance sometimes described as "lenticular cancer." The microscopic examination of fragments removed for the purpose revealed the appearances characteristic of carcinoma. Amputation being out of the question, 1 gramme ($15\frac{1}{2}$ grains) of $\frac{1}{2}$ -per-cent. solution of methylene blue was injected into the tumor every day, the ulcerated surface being dressed with 1-per-cent. solution of the same substance. Within a fortnight of the commencement of

treatment the pain and haemorrhage ceased and the tumor had shrunk in size. In four months it had disappeared, together with some enlarged glands in the axilla and numerous nodules in the skin around the breast. In place of these, however, several new nodules had formed. In the mean time the tumor in the other breast had grown considerably, and was removed. The patient was re-admitted to the hospital some time afterward with pleurisy of the left side (which had been the seat of the ulcerated mammary tumor); there appears to be no evidence, however, that this was due to extension of the malignant disease. Of the tumor itself nothing remains but a firm, lardaceous cicatrix, partly covered by blackish crust, with a few cutaneous nodules, which disappear and form again according as the injections are given or withheld. D'Ambrosio thinks the treatment in this case has certainly prolonged the patient's life more than a year, and, notwithstanding the unfavorable conditions, he does not despair of a complete cure.

Brissaud ¹⁴ advocates strongly the use of chlorate of sodium in 10- to 30-grain (0.65 to 2 grammes) doses, three times a day, in the treatment of cancer of the stomach, and reports two cases of extreme benefit having resulted from its use.

Wight ⁹⁶ offers the following mixture as one that seems to control, to a certain extent, the development of cancer:—

R. Arsenici iodidi,	.	.	.	.	.	gr. j (0.065 gramme).
Potassii iodidi,	:	:	:	:	3ij	(8.0 grammes).
Syr. ferri iodidi,	.	.	.	.	3iv	(124.0 grammes).
Tr. columbo,	.	.	.	.	3xxiv	(93.0 grammes).
M. Sig.: Take a teaspoonful after meals in a wineglassful of water.						

As a local application, Bougard's formula seems to take the precedent:—

R. Wheat-flour,	.	.	.	.	60.0	grammes (2 ounces).
Starch,	.	.	.	.	60.0	grammes (2 ounces).
Arsenic,	.	.	.	.	1.0	gramme (15 <i>1</i> / ₂ grains).
Cinnabar,	.	.	.	.	5.0	grammes (1 <i>1</i> / ₂ drachms).
Sal ammoniac,	.	.	.	.	5.0	grammes (1 <i>1</i> / ₂ drachms).
Corrosive sublimate,	.	.	.	.	0.50	gramme (7 <i>1</i> / ₂ grains).
Solution of chloride of zinc at 52°						
F. (11.1° C.),	.	.	.	.	245.0	grammes (8 ounces).

The first six substances are separately ground and reduced to fine powder. They are then mixed in a mortar of glass or china, and the solution of chloride of zinc is slowly poured in, while the

contents are kept rapidly moved with the pestle so that no lumps shall be formed. A thick layer of this is spread on cotton and left in position twenty-four hours, and then managed in every way as Marsden's paste. Few cases require a second application. The ulcer may be dressed with balsam of Peru, or aristol ointment, of varying strengths, according to the stimulation required, and all exuberant granulations are to be kept in check by the usual methods.

Verdié,¹ discusses the spread of carcinoma from the mamma to the sternum, and its recurrence in that bone after ablation of the breast. He regards implication of the sternum as a concomitant or sequel of mammary cancer as of more frequent occurrence than is generally supposed. He thinks that the bone should be examined as carefully as the axilla, and that the presence of secondary nodules on its surface is a contra-indication to removal of the breast.

SARCOMA.

Garier,⁷ presents the case of a patient in whom there were a great number of tumors developing within the space of two years, in almost every organ of the body. The histological examination revealed round-celled sarcoma with an alveolar stroma. The point of origin of these tumors seems to have been in the parotid region, and at no time seems to have produced an inflammatory reaction. Death resulted at the end of two years from a cachexia, profound anaemia, and anasarca.

Firke⁵², relates his successful inoculation of rats from sarcoma of other rats, and seems to have established fully the transmission in series of this affection. Jackson Clarke,² reports cases of sarcoma in which he distinctly finds evidences of psorosperms, and from which he concludes that sarcoma, as well as carcinoma, is due to the development of these bodies within them.

William B. Coley⁴⁸² reports his experience, as well as that of others, in the treatment of inoperable sarcoma by the toxic products of erysipelas. The results of his experiments and investigations are as follow: Of 43 cases of malignant disease associated with erysipelas, 20 were carcinoma, 19 sarcoma, and 4 either carcinoma or sarcoma; in 23 cases the erysipelas was accidental, and in 15 the result of inoculation. Of the 20 cases of carcinoma 3

were permanently cured. In addition, one case of probable carcinoma was well five years after an attack of erysipelas; one died from the inoculation. Most of the remaining cases showed more or less improvement, which, though temporary, undoubtedly added to the life of the patient. The toxic products were obtained by making pure cultures of erysipelas germs in bouillon, with 5-percent. glycerin, and filtering this through a porcelain filter. The doses varied from 0.5 to 1.5 cubic centimetres ($7\frac{1}{4}$ to $23\frac{1}{4}$ minims).

Spronck,⁶ likewise concludes that the products of erysipelas in certain cases can act in a curative manner upon malignant tumors.

SECONDARY NEUROFIBROMA.

Gané²⁶,_{pp.1} emphasizes the following conclusions as to this particular morbid growth: 1. In examining small fibromata by Weigert's method we find the residua of nerve-fibres, and are enabled to demonstrate many small molluscous swellings in the palms of the hands and soles of the feet,—parts previously considered to be immune from that disease. 2. Among neurofibromata, the smaller ones, given off as swellings of the minuter nerve-branches, are almost completely without the perineurium, whilst those larger ones, on the cutaneous nerve-cords, are not so. 3. In neurosarcoma of the sciatic nerve the principal feature is the existence of spindle-cells in the connective tissue forming the matrix or groundwork, and, besides these, the swelling contains, in addition to regular lymph-spaces, irregular glandular tissue, the spaces of which are lined with very fine cubical and, in some cases, ciliated epithelium.

Gilbert⁵⁵,_{Nov. 19, '93} says that these tumors are generally benign fibromata, myxomata, or sarcomata. Epitheliomata are rare. As to the word "neuroma," it can only be used clinically, or it does not designate a special tumor. Fibromata seem to start from an hyperplasia of the neurilemma, or the sheath of the nerve. In all cases enucleation is to be practiced; resection must only be employed as a last resort. The nerve should always be sutured when possible.

Berg²,₁₈₉₇ describes a case of congenital plexiform neuroma in a woman aged 29, the growth being situated on the right arm, in the pectoral region. The skin from the shoulder to the wrist

was of a grayish-brown color, and was folded in deep, transverse furrows. The natural ridges and folds of the skin were greatly hypertrophied. Small seed-like hardenings could be felt under the skin. On palpating still deeper through the thickened cutis, an irregular netting of hard cords through the knotted swellings could be felt, varying from the size of a hazel-nut to that of a walnut. They were almost like cartilage in hardness, round and cylindrical, and arranged partly in rows. This was the case especially in the arm, along the intermuscular septa. Part of the skin in some of the larger tumors was excised, and on examination the latter were found to be pure fibromata, but the changes in the cutis presented a typical example of plexiform neuroma.

ENCHONDROMA.

Frank,⁸⁰ reports a case of large enchondroma of the scapula resulting from a contusion, in a man 45 years of age. The tumor was removed by von Dittel, and weighed about 9 pounds ($4\frac{1}{2}$ kilogrammes). About two years later a small growth was noticed in the clavicle, and in a few months a tumor the size of a child's head was removed. The following year the tumor began growing in the infra-clavicular fossa, and soon reached the size of an orange. This was likewise extirpated and the patient recovered. Another operation was done for a similar growth in the same region a year later. Still one year later the tumor returned, and a portion of the clavicle and spine of the scapula were removed. One year later the man again returned with a tumor involving the remaining parts of the scapula and clavicle. A shoulder-joint amputation was performed and the entire clavicle and scapula removed. The patient recovered. As soon as he was out of bed there immediately developed a marked right convex scoliosis.

Monestié, Coine, and Cannieu,²²⁰ likewise report multiple cases of enchondroma. The tumor is formed of a fundamental, clear, transparent substance; blood-vessels are few and ramify, reaching the same size as the trunks from which they spring.

MISCELLANEOUS TUMORS.

Gilles de la Tourette,⁹⁸ divides mammary hysterical manifestations into two principal varieties: A diffuse, extensive swelling or localized tumor, generally characterized by a marked superficial

hyperæsthesia, which is peculiar to these growths. The slightest touch, or even grazing them, is insupportably painful. This zone of hyperæsthesia is also hysterogenic, pressure bringing on an attack. The œdema which accumulates around the tumefaction may give rise to ulcerations, and, in this condition, the analogy with a malignant tumor is still greater; indeed, cases are known where such tumors have been operated upon. As to the treatment, compression has no influence, and only treatment of the hysteria will bring about a cure.

Matas¹², reports a case of molluscum fibrosum pendulum in a colored woman aged 42. The tumor sprang from the umbilical region, and developed during twenty-eight years. At the same time there were numerous other growths developing over the body. The tumor measured twenty-three and one-half inches in its broadest portions and thirteen inches in length; pedicle fourteen inches. It was successfully removed.

SURGICAL DISEASES.

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HYDROPHOBIA.

THE year just gone has not been marked by any special advance in the investigations on hydrophobia. Notwithstanding the usual number of published reports of individual cases, the disease itself, from the scientific point of view, seems to have been less considered. If we could accept as final the reported results of antirabic inoculation, as practiced in Italy under the observation of Tizzoni, in his laboratory in the University of Bologna, we might indeed have reason to believe that the dread disease would soon be robbed of its greatest terrors; but, although most suggestive and encouraging, the conclusion is inevitable that, up to this time, the position taken by Tizzoni and his followers, as the result of their experimentation, has not been established.

In a paper read at the annual meeting of the British Medical Association for 1892, Tizzoni,² with his collaborator Centanni, described a chemical vaccine extracted by them from the central nervous system of rabbits dead from fixed virus. This vaccine is described as being in solution nearly colorless or slightly straw-colored, and is of such proportion that every 10 cubic centimetres ($2\frac{1}{2}$ drachms) contain the dissolved active principle of about 1 gramme (15 grains) of the rabid nervous system. This solution is said to be without hurtful action of any kind, either local or general, and, being a solution rather than an emulsion, is rapidly absorbed when injected subcutaneously in animals. The exact method of preparation has not yet been described, but numerous inoculations have been made with it on rabbits, with the apparent result of not only conferring immunity against subsequent infection, but also of preventing the disease after infection,

even when initial symptoms had appeared. In their experiments, the virulence of the primary virus obtained from the dog had been proven, and all their investigations emphasized and supported by control experiments conducted at the same time. In the line of preventive inoculation, a series of 14 cases were described, in which was employed varying quantities of the vaccinating solution, repeated for a varying number of days, and on the day after the final inoculation the animal was infected under the dura with the virus of street rabies. Twelve of the animals so treated lived; two died of rabies,—one on the fifteenth, the other on the twenty-second day after infection,—and both of them had received insufficient quantities of the vaccine,—one 7 cubic centimetres ($1\frac{1}{2}$ drachms) and the other 10 cubic centimetres ($2\frac{1}{2}$ drachms). In this connection, the reporters stated that an amount of the solution less than 15 cubic centimetres—equivalent to $1\frac{1}{2}$ grammes ($23\frac{1}{2}$ grains) of the cord material—would not insure the best results. They concluded that they could always succeed in vaccinating the rabbit against subdural inoculation with rabid virus, and that in order to obtain immunity it was not necessary for a considerable time to elapse between the vaccination and the infection, but, on the contrary, if a sufficient single dose of the vaccine was employed, subdural inoculation might be practiced the following day without effect.

In some further experiments on preventing the development of rabies in rabbits after infection with the virus of street rabies through the sciatic nerve, these same observers succeeded, by using large quantities of the solution at different intervals, in saving four out of six animals. They consider that from 20 to 50 cubic centimetres (5 to 12 drachms) of the vaccine material is necessary to assure results; and of the two animals which succumbed, in spite of treatment, one had received only 20 cubic centimetres (5 drachms) of the solution, and the other was only vaccinated on the seventh day after infection. As necessary points to be observed in the treatment of these cases, large doses begun not later than the fourth day after infection seemed necessary. Tizzoni believes that their method of vaccination is much more efficacious and much more easy of application than that of Pasteur's, out of which it has grown, because their vaccine is not attenuated, is not virulent, and because it can be administered in the form of solution.

These observers claim that the scientific importance of their discovery "consists in the fact that this is the first time that it has been possible to isolate a vaccinating substance which, while not being in itself chemically pure, is yet entirely deprived of all toxic and virulent matter, and highly charged with vaccinating property." In this way they believe that they have established the principle which, "up to this time, has not gotten beyond the stage of hypothesis, that vaccination is an entirely chemical fact or phenomenon due to the presence of a particular substance developed from the infecting agent in the media of those cultures which are special to it."

Finally, Tizzoni and Centanni believe that the idea of systematically vaccinating all dogs should be taken into serious consideration, and that in this manner, "by attacking rabies at its original source, it would be possible to insure an efficacious and radical preventive against the disease, and to reduce its extension within extremely narrow limits."

The journal attacks on the Pasteurian method, while perhaps less frequently encountered than formerly, are by no means wanting. The revised list published by the Society for the Protection of Animals from Vivisection,²⁸ includes, up to June, 1892, no fewer than two hundred and thirty persons who have died at one time or another from hydrophobia following treatment in some Pasteur Institute. The possibility of hydrophobia being produced by the inoculations themselves is also still considered.

On the other hand, the report of the antirabic vaccinations conducted in the Pasteur Institute in Paris for 1892²¹² shows the lowest mortality yet announced. In a total of 1793 persons treated there were only 7 deaths (0.39 per cent.), and of these 3 occurred from hydrophobia developing within fifteen days after the beginning of the treatment. These, according to the reporter, Poitevin, should not be regarded as affecting the efficacy of the inoculations, and, excepting them, the mortality stands at 0.22 per cent., or 4 deaths in 1790 cases. In the Pasteur Institute since 1886, 12,782 patients have been treated, and of that number 68 have died,—an average of 0.52 per cent.

In his report Poitevin recommends vigorous measures to prevent the spread of the disease in man and in animals, especially in agricultural districts. In France, according to this author,

hydrophobia is most prevalent in the spring, while in the autumn the cases are fewest.

How many of the so-called cases of hydrophobia are not hydrophobia at all, but only lyssophobia, is of course uncertain, but it is not uncertain that the fear of the disease may in certain subjects encourage symptoms simulating it and even cause death itself. Evidence is not wanting to show that actual changes in the spinal marrow may follow persistent nerve impressions not caused by disease; and until the pathology of rabies is more definitely established, and the disease processes more clearly understood, there will not be wanting those who will deny altogether the actual existence of a specific disease following the inoculation of saliva from rabid animals. It is very certain that in many populous communities busy practitioners have grown old and died without ever encountering the disease. It seems paradoxical that the most deadly of diseases, and one at the same time widely distributed over the earth, should of all others be most often called into court to prove its very existence.

S. Kotak,²³⁹ of Umaria, India, mentions a remedy which he saw given to no less than thirty people within a month after having been bitten by rabid dogs. In no case had rabies developed after a year. Curious symptoms were caused by this drug, notably, difficult and painful micturition, with the passage from the urethra of a number of polypoid bodies; and these symptoms, the author insists, were not produced in those not bitten by the mad dog. A sample of the drug sent to the Indian Museum, Calcutta, proved on examination to be an insect of the cantharides family, closely related to, but not identical with, the ordinary *Cantharis vesicatoria*.

TETANUS.

The question of the cause and nature of tetanus being now about settled, recent literature on the subject has to do largely with the reported cases of the disease, and especially with the means most efficacious in bringing about cure. Interest in Tizzoni's antitoxin inoculations continues unabated, but the real value of this remedy against the existing disease has yet to be demonstrated. Meanwhile other agents not so novel are being submitted to renewed tests, and along the whole line some genuine advance is to be noted.

In the French Academy of Medicine, Paul Berger,^{10 Nov. 20, 1892} reported a case of tetanus ending in recovery, and this report, together with the discussion, evoked many interesting points on the subject. The case, briefly, was as follows: A young man of about 21 years, on July 23, 1892, sustained an injury to the little finger of the left hand. Fifteen days later he developed tetanus, and three days after this, on the 9th of August, he was admitted to the hospital with distinct evidence of the disease. The wound was carefully cleaned and dressed and chloral freely administered, both by mouth and rectum. At first about 3 drachms (12 grammes) daily were given, and after several days this was increased to as much as 6 drachms (24 grammes) in the twenty-four hours. In spite of this and the further use of morphia, the disease progressed, and a fatal termination seemed likely. On September 2 the wounded finger was amputated, and on the same day and on the days following, under the advice of Roux and with serum furnished by him, antitoxin inoculations were practiced. An amount of the serum about equal to 1 drachm (4 grammes) of the dry extract was used once daily for several days. Following these procedures there was a marked and immediate improvement, and the patient went on to a complete recovery. Berger admitted that some of the improvement might have been due to the inoculations, but said that the experiments of Tizzoni and Centanni and those of Roux all indicated that the serum had only a prophylactic value, not being of use against the established disease. He ascribed the cure to the amputation, and indorsed this procedure in suitable cases. The only other case which had recovered in his hands had also been submitted to it, and a dozen others not operated upon had all died.

In the discussion Charpentier thought that the large and long-continued use of chloral in this case was an argument against the opinion of Virchow and others among the Germans, that this drug in such doses caused fatty emboli. Polaillon cited a recent case of his own where the results were quite contrary to those obtained by Berger. In this case broad excision of the wounded area on the first appearance of tetanus, coupled with antitoxin inoculations by Roux, failed to prevent or delay a rapid death from the disease. Nocard said that Polaillon's case, in his opinion, did not go to prove the inefficacy of the serum treatment. Serum

always gives immunity when its use precedes the tetanus inoculation. If not used until after the inoculation, it cannot counteract the poison already absorbed, but may prevent and will prevent new absorption, destroying poison admitted little by little into the economy. On this account this agent is of value in subacute and chronic tetanus, not in acute cases. Chronic cases may recover without treatment, but, on the other hand, the serum may effect the cure. Weber cited the fact that, among veterinarians, when tetanus developed in the horse after "docking" the tail, a new amputation, done at once at a higher point, was often the means of saving the animal.

In a further consideration of the subject before the same society, at a later meeting, Verneuil¹⁰ cited the noteworthy discussion on tetanus before the academy in 1889, saying that since that time, while old remedial agents had not been neglected, special interest had been taken in the employment of the new antitoxin, serum inoculations. The use of this agent had been followed in some cases by definitely good results; but often, also, the results have not been good, and at this time we are without a means of positively destroying in the body the germ of Nicolaier and its produced toxins. Berger had revived, as of great importance, the old method of amputation or excision of the infected foci. This method, while theoretically logical,—experiment showing that the microbe is confined for a greater or less time about the wound area,—is in practice very uncertain and often entirely futile. Sometimes the operation is of genuine use when done early in suitable cases, sometimes it is impracticable, and then again it may be positively harmful. Amputation or other serious operation had in certain cases been the direct cause of death by further exciting tetanic spasms, and the use of an anæsthetic had also acted to a considerable extent in the same way. Six cases were mentioned where amputation in no degree delayed a fatal termination by the disease, and in three of these cases the operation preceded the onset of tetanus, being performed for other conditions. One is led to believe that the organism is poisoned, in many cases at a very early hour after injury, either by the microbe or its produced toxins. Chauvel spoke of the special interest felt by army surgeons in the study of tetanus, and cited the many amputations done in military practice against the disease. The results had not been more favorable than

those obtained by less vigorous procedures. Under all forms of treatment there had been some recoveries and many deaths. He thought that the two cases described by Berger were not of a sort to modify existing opinions on the subject. If amputation were of any real value it should have been shown experimentally; and in his experiments on animals Vaillard had not succeeded in any case in curing the disease, once evoked, by amputation or excision. The operation itself might powerfully excite the nervous organization. Prophylaxis even now is of much more importance than any subsequent treatment. If the researches of Vincent and Vaillard are accepted, showing that Nicolaier's bacillus is only active in the presence of one or more of the pus-forming organisms, the antiseptic treatment of wounds possibly infected with tetanus should be particularly vigorous. Trasbot spoke of tetanus in the horse, saying that if the animal did not die in the first week of the disease the chances for recovery were very good. If death did not occur before the end of the second week, recovery was the rule, and that without reference to the treatment employed. In animals, as in man, very much depended on whether the disease were acute or chronic. In animals, also, vigorous treatment was generally bad, even subcutaneous injections being often the means of exciting renewed spasms. An experience of twenty years led this observer to the conclusion that the best results in treatment were to be obtained not by amputation or excision or injection, but by absolute quiet, abundant nourishment, and the use of sedatives.

Le Blanc indorsed the opinion of Trasbot, saying that if we take into consideration the marked difference between acute and chronic tetanus, we can well understand the apparent good effects obtained in some cases by antitoxin injections. Many so-called chronic cases recover without reference to the kind of treatment. He believed in the value of antitoxin as a prophylactic agent, but as a means of cure, so far from doing good, he was quite persuaded that it had done positive mischief, intensifying the tetanus, as Koch's tuberculin had in some cases intensified tuberculosis.

Le Fort spoke positively against the use of anæsthetics in cases of tetanus; he had twice stopped the chloroform because of deepened symptoms, and once he had seen death on the table from its administration. He did not believe in amputation as a cure for the disease. He had used chloral, but not more than 150 grains

(10 grammes) in the twenty-four hours. He should fear cumulative effects from larger doses. He had succeeded in relaxing the spasm by the use of the constant current. He had never seen an acute case cured by any method of treatment. Laborde thought that chloral might be given for a long time, and in large doses, without evil effect in cases of tetanus. He thought, also, that bad results from chloroform might be markedly lessened by the simultaneous and free use of morphia hypodermatically.

In a recent note on the treatment of tetanus, Vaillard²⁴³ touches on several points already referred to in the discussion before the academy. He speaks of the disease as an infectious malady produced by the evolution of a specific bacillus in a wound where it secretes its poison. The pathological agent only exists in the wound and is not generalized, and on this account it seems right to practice, in the beginning, ablation of the infected area in order to lessen or destroy the poison. Veterinarians are said to have stopped the progress of the disease in horses by a second amputation of the tail in cases of tetanus following "docking." Nevertheless, laboratory experiments of the same sort on rabbits and guinea-pigs have not been followed by good results, although large extirpations and amputations have been done as early as eight hours after the invasion of the disease. It is difficult to determine at the onset whether the disease is to be acute or not, depending on the intensity of the germ culture. Excision of the wound area at this time will not prevent or modify the most intense forms, but may those less virulent. The question of applying serum of immune animals to the treatment of the disease in man is not yet settled. An immunity against the disease may in this way be produced, and this should be thought of in certain districts and under certain conditions. Since the general employment of vigorous antisepsis in wound treatment, the disease is not so frequently encountered, and attends generally wounds apparently insignificant.

Ferraton²⁴³ has published an account of a case of tetanus occurring in a soldier of 23 years, who, falling on ground much used by horses, had sustained dislocation of the right ring and middle fingers, complicated by a dorsal abrasion. Treatment was delayed and the luxations only repaired, and the wound dressed on the following day. In ten days the wound had healed and the man

apparently was quite well, but forty-eight hours later, twelve days after the accident, tetanus developed. In spite of chloral and morphia in large doses, the symptoms became more severe, and disarticulation of the wounded (middle) finger was practiced. Amelioration followed and the sedatives were lessened. Later on there was a new accentuation of the disease, and large doses of chloral and morphia were resumed. Cure finally resulted. Inoculations from the ground and from pus from the finger gave positive results, fatal tetanus being produced in animals. The bacillus of Nicolaier was also demonstrated. Inoculations from the urine were negative. Chloroform was administered at the time of operation without evil effect. Ferraton indorses amputation, and says that in such lesions of the extremities we should not hesitate to employ it. He thinks that much confidence cannot be placed in the use of morphia and chloral.

Cerné²⁰³ has reported a case of subacute tetanus, in a boy of 16 years, following an injury to the left middle finger. The patient was admitted to the hospital on November 14th with the disease well developed, and by December 1st, in spite of some good effects from medication, the symptoms became most serious. At this time amputation of the affected finger was practiced, and following this improvement was marked and permanent. While under chloroform the patient had a very severe seizure, but reacted promptly afterward. Cultures made from pus from the wound developed only staphylococci. From the amputated finger there was obtained a short, thick bacillus of indefinite character, and which did not cause tetanus when injected into a guinea-pig.

Chouppe¹⁴ has published an interesting *résumé* of recent progress in our knowledge of tetanus. He cites the work of Behring and Kitasato, Roux, Vaillard, and others, speaks of the reported cures in Italy following antitoxin inoculations, and mentions eight cases in France where serum prepared by Roux had been used in the attempt to cure the disease in man. He says that the serum has never been used alone in the cases which have recovered, and that, for this reason, its value is uncertain. He compares the action of the produced poison of tetanus with that of strychnine, and concludes that bacteriological research has not yet given us an agent of genuine curative value against the confirmed disease. In treating tetanus we must still employ the two single means which

are of undoubted value,—the excision of the wound, which arrests the formation and absorption of the poison, and the use of nerve-sedatives, which lessen the immediate dangers from convulsion and give to the patient time to eliminate poison already absorbed.

Some of the most important work of the year on tetanus has been done by Courmont and Doyon, in Lyons, in the laboratories of Arloing and Morat.^{210, 211 Jan., Jan. 29, May 7} These observers have investigated the subject from various points of view, and have published some noteworthy results. In a series of experiments on the mechanism of the production of tetanic convulsions, they claim to have established that the poison of tetanus has no direct effect on muscular fibre, or on motor nerves, or on the central nervous system. These results are diametrically opposed to those obtained in earlier experiments by Vaillard and Vincent. Courmont and Doyon used curare to isolate the muscular fibre from its motor nerve, and the first set of experiments had to do with the use of this agent on tetanized animals. The isolated muscles did not, in any case, take on tetanic contractions. Other experiments included section of the motor nerves, destruction of the lumbar spinal medulla, and the use of chloroform.

These investigators conclude that tetanic spasms are reflex, produced by peripheral irritation to sensitive nerves. Frogs, guinea-pigs, rabbits, and dogs were used in making these observations. In experiments on animals tetanic contractions begin usually at the point of irritation (inoculation) and remain for a time local. The horse is an exception to this rule. In this animal the convulsions begin in certain muscles of predilection, resembling in this respect the disease in man, where trismus is usually the earliest symptom. As the result of some interesting investigations on the mode of action of the soluble products of Nicolaier's bacillus in the causation of tetanus, these same observers formulate the following conclusions: 1. The bacillus of Nicolaier causes tetanus through the activity of a soluble ferment which it creates. 2. This ferment is not directly toxic, but elaborates within the organism the actual poison, which may be compared to strychnine in its general effects. 3. This last substance may be found in abundance in the tetanized muscles, in the blood, and sometimes in the urine. 4. It resists prolonged boiling, although the products of the bacillus become inactive above a temperature of 65° C. (148.5° F.).

5. It demands for its formation favorable conditions of temperature. In this way is explained the immunity of frogs in winter. 6. Immunity, natural or acquired, against tetanus may be considered as the result of causes which prevent, hinder, or arrest the above-mentioned fermentation.

Charles M. Blackford, Jr., of Lynchburg, Va.,⁸¹ in a careful study of tetanus, notes particularly the conditions of normal muscular contraction and afterward those abnormal or pathological. He marks the striking similarity between the symptoms of tetanus and those of strychnine poisoning, and sums up the results of recent investigation in the following form : 1. Tetanus consists essentially of a tonic spasm of certain muscles or groups of muscles which have been thrown into the state of physiological tetanus. 2. This is caused by an abnormal irritability of the reflex centres in the medulla and cord. 3. This hyperæsthesia is the result of the physiological action of certain ptomaines, or alkaloids of decomposition, formed in a wound and absorbed therefrom. 4. These ptomaines are the result of the growth of a specific bacterium called the bacillus of tetanus, or the bacillus of Nicolaier, and only by it. 5. Therefore tetanus is a toxic disease, caused by the infection of a wound by this specific bacterium or its products. In treatment, after insisting on the utmost diligence in wound disinfection, he mentions physostigma as "our chief reliance among drugs,—a very questionable statement,—refers also to the other sedatives and to digitalis and alcohol, and notes, finally, the advent into the therapeutic field of Tizzoni's antitoxin.

An interesting point in the etiology of tetanus and an illustration of how unconsciously bacterial poisons have been employed as instruments of death in war waged against man are afforded by some recent studies of the poisoned arrows, old and new, used in battle by the natives of the New Hebrides.¹⁵³ The points of these arrows are inserted in the soil of certain marshes and afterward dried. In those wounded by them tetanus usually develops. Scrapings from the arrow-heads injected into guinea-pigs cause rapid death from septicæmia. Cultures from the earth revealed the presence of two pathogenic organisms,—the septic vibrion and the bacillus of tetanus. As the reporter, le Dantec-Roland, remarks, the fact that there are no horses in these islands negatives, in a way, the so-called equine origin of tetanus.

VENOMOUS WOUNDS.

The cases of snake-bite reported year by year from different parts of the world are scarcely more numerous than the reports of remedies more or less certain to counteract the effects of the injected poison. Without question, hundreds of people bitten by harmless snakes have been subjected to the most active treatment, and, while only suffering from too vigorous medication, have died from the treatment employed, their deaths being ascribed to snake-poisoning; while much more frequently they recover and the credit of the recovery is given to the very agents causing their discomfiture. It is certain that, as things go, the majority of those inoculated by the snake with venom enough to kill die, whatever be the means employed to overcome the effect of the bite. The reason for this is obvious. Both the method of injection and the nature of the poison injected favor, in the stricken individual, the quickest absorption and gravest constitutional involvement. The best remedial agents are those for the most part directed against the secondary effects of the poison rather than the poison itself; and even if the means were perfect and the necessary intelligence wide-spread, it could seldom happen that they would both be at hand when most urgently needed.

Venomous snakes are, really, in many parts of the world, much less frequently found than is generally supposed. In our own country they are not numerous, and grow less so year by year. Many innocuous snakes are commonly regarded as dangerous, and some really venomous snakes are considered harmless. There are very few deaths from snake-bite in the United States. In Europe some specimens of the viper family make up about all of the poisonous snakes encountered, and deaths from snake-bite are very rare. A fatal case of poisoning occurring in a boy of 11 years, in South Wales, has been recently published, because of its rarity, by Jennings and Fraser.^{2,15} Perhaps without treatment the majority of those bitten by poisonous snakes in temperate climates would recover; but it is in tropical countries—in India and the West Indies, in South America, Australia, and Africa—where serious loss of life is caused by the bites of venomous reptiles. In India the number of deaths from snake-poisoning is appalling. It is stated that for the year 1891 over 21,000 human beings died in that country from this cause alone. Toward com-

bating this evil but little has been effected. Fayrer,² June 17, long identified with whatever is known of the poisonous snakes of India, has recommended that rewards should be given for every venomous snake destroyed, and especially directs attention to the cobra, krait, daboia, and echis as those most fatal to man. He suggests that descriptions of the poisonous varieties should be widely distributed through the country and, further, that some special officer should be appointed to put into execution the most vigorous measures of protection.

The marked interest so generally felt in recent years in the hypodermatic use of strychnia in cases of snake-poisoning has in no degree lessened. In Australia the controversy as to its value is still waged vigorously between Mueller and his followers and their opponents. ²⁶⁷ Feb. 15, Apr. 15, July 16 Notwithstanding that its activity against the effects of venom in the living body is not yet determined, its well-known toning, stimulating properties under all conditions, and the numerous reports from its use in those inoculated with snake-poison, seem to establish it as about the best remedy at our command. Extended and careful experimentation with the agent in other countries and by other observers will, however, have to be made before its position is quite defined. Some efforts toward this end have already been inaugurated, and, as the English government has become interested in the matter, it seems likely that an extended trial of the agent will be made against Indian snake-poisons. There is already a strong advocate of strychnia in India in Banerjee, of Rajputana,²³⁹ Nov. 17 who has used the drug with success against the bite of the formidable bungarus (krait), as well as with several of the echis species. In the series of cases reported by Banerjee, in which strychnia was employed, its use seems to have been followed by distinctly good results. It is to be hoped that further investigations will be made.

In a late report, Mueller²⁶⁷ Aug. 15 describes a number of cases, coming under his observation, of hæmaturia following snake-bite. This complication, although unnoticed, he regards as perhaps a not unusual one. It is serious, indicating decided fault in the kidney function, and, according to the author, causes death in many of the cases of delayed poisoning, the end coming after many hours, sometimes after several days. He characteristically recommends strychnia as the only agent likely to mitigate this evil,

citing its action on the renal arterioles and the general circulation as the only means of restoring the kidney function.

An interesting review of an undoubtedly clever brochure has been published by Guinard.²¹¹ The author of the work is Kaufmann, already well known as the recipient of the Orfilla prize for his investigations on viper-venom. Kaufmann has very recently made a comprehensive study of the vipers in France, some specimens of which are the only venomous snakes to be found in France. Death in the adult following their bite is rare, but may occur. This view has been opposed by Fontana and Robin. In Kaufmann's hands many inoculation experiments were made on dogs, rabbits, guinea-pigs, and frogs. As the cause of death following viper-bite he mentions the paralyzing action exerted by the venom on the smaller vessels and capillaries; in a modification of the blood-globules resulting in their easy departure from the vessels; and in this stupefying and paralyzing influence of the venom on the nerve-centres, especially on that of respiration. Following these experiments it is announced that snake-venom does not kill from contact with veins or the conjunctival or other mucous membrane, or even when swallowed; that it is toxic when deeply introduced into living tissues, but usually innocuous when placed on open wounds, however large. Some animals, but no warm-blooded ones, resist the poison altogether. Kaufmann thinks that protection should be afforded the little hedgehog, since this animal constantly destroys many snakes. Kaufmann's experience leads him to believe that the poison is absorbed slowly from the wound in most cases, and he insists that in addition to the usual measures of ligature, excision, etc., local injections of permanganate of potassium (1 to 100), as recommended by Lacerda in 1881, or of chromic-acid injections in the same proportion, as advanced by himself, should be uniformly employed. In this connection it may be mentioned that the first claims advanced for the permanganate of potassium, as against such poisons, seem scarcely sustained by its later use.

In the line of chemical injections, Calmette,¹¹³⁵ whose position as Director of the Bacteriological Institute in Saigon, Cochin-China, has given him exceptional opportunities for such work, has tried the effect of 1-per-cent. solutions of chloride of gold against cobra-venom. According to this observer, by this means a genuine

neutralizing influence may be determined over venom already absorbed into the body. Numerous agents have been found which will destroy snake-venom in bulk or unabsorbed in wounds, but it is not yet proven, in spite of Calmette's report and others of like kind, that the neutralizing influence of any chemical can be made to extend to poisons already absorbed.

Comparatively little is known of the relative importance of animal bites as a source of peculiar poisoning. It would seem that, except for some unusual circumstances, they are not more to be dreaded than wounds inflicted and infected by other means. The bite of the tiger produces a wound long supposed as very liable to take on septic complications, and such reports are not wanting in the case of wounds inflicted by the lion, the shark, and other large animals. In our own country there are those who believe that the bite of the horse has a peculiar significance, and, indeed, some curiously-persistent complications have followed the bites of human beings. A report from Florida (Sprague¹⁸⁶) would seem to show that alligator-bites are only serious as other wounds would be. A boy whose whole lower extremity was swallowed by an alligator, and on which twenty-eight distinct wounds, many very large, were inflicted, recovered promptly and entirely, although special antiseptic measures do not seem to have been employed.

Among the smaller animals whose bites from time to time have been regarded as particularly dangerous may be mentioned the skunk, the cat, and, more than all the rest, the rat.

Among those animals who poison by stinging rather than biting, the scorpion holds first place. Espinosa has (report of Corresp. Editor Semelede, Mexico⁶⁷³) carefully studied the scorpions of the State of Morelos, Mexico. He says: "The sting of the scorpion produces a feeling like that of a needle running through the skin. . Numbness and formication immediately follow, extending rapidly to the head, limbs, and sometimes invading the whole body; there is itching in the nose and sneezing, difficulty of swallowing, trismus, numbness of tongue, difficulty in speaking, dyspnoea, accelerated breathing, spasm of glottis, cough, ptyalism; the saliva has sometimes a bad odor; there is micturition, rarely vomiting, bloody stools, scanty urine. Some patients feel as if their eyes and face were swollen, and suffer from sleeplessness and photophobia. To some every object appears as though veiled.

Intelligence remains unimpaired. At the locality of the sting only a little speck or papule is noticeable."

The poisoning proves fatal only in children. The oldest child dying under Espinosa's observation was one of about 11 years. Some persons seem not to be at all affected by the sting. Much depends on the species of scorpion, those from "hot lands" being most dangerous. Various remedies were tried, among others jaborandi and alcohol internally and suction, scarification and ligature locally. No specific has been found. In the town of Durango scorpions abound, and the city authorities have for years given a small reward for those delivered to them. Boys, using long sticks with a burning coal at the end, smoke the scorpions from their nests, catch them, pinch off their stings, and collect them in bottles. In this way many thousands are killed every year.

Banerjee, already mentioned for his observations on snake-poisoning, has also published his experience with the scorpion.⁶ In two months in 1892 he treated forty-two cases. He noted four varieties of the animal, all poisonous. The symptoms observed in these cases were, for the most part, local and of varying intensity, although constitutional effects were also noted. In some cases an erysipelatous swelling requiring treatment remained about the part stung for as long as seventy-two hours. As a means of overcoming the distressing burning pain, so common in this affection, chloral hydrate, used locally by rubbing into the affected part, proved most efficacious.

Another Indian investigator, Poredi, of Akalkote, Deccan,²³⁹ has used cocaine in some thirty cases of the same trouble. He states that the relief afforded by this agent is by no means always magical, as some earlier reports would have us believe, but that, in his hands, by its employment relief, to a certain degree, was often obtained, and, as a rule, in from two to three minutes. His method was to use 1 grain (0.065 gramme) of the drug in 10 to 15 drops of pure water hypodermatically in the neighborhood of the bite.

TRAUMATIC FEVER AND KINDRED DISORDERS.

The practical surgeon of to-day gratefully acknowledges, as the source of his vastly widened usefulness, the work accomplished in bacteriological laboratories on the so-called pathogenic germs

and their derivatives. As a result of this work, the germ theory of disease as such is, as a rule, no longer discussed, but accepted as a thing established. The value of the lesson learned is shown in the brilliancy of modern surgical procedures. Laudable pus after clean operations is only admitted in the work of one's neighbors. The phenomena of traumatic fever without the existence of a poison circulating in the blood are explained by Malcolm,⁶ as due to a peripheral stimulation of nerves acting on the heat-centres; and, certainly without evil result, fearless explorations are constantly made in body-cavities a few years ago considered sacred from the surgeon's knife. The increased knowledge of wound processes, the causes of infection and of septic poisonings, the value of cleanliness and of surgical antisepsis, all mark a distinct era of medical progression. Still, almost nothing is definitely proven, and every question remains unsettled. The influences of the soil from which germs spring, the conditions of the soil on which they are planted, the relations of tissue to germ and of germ to tissue, virulence, immunity, and the action of chemical antiseptics, all promise material for the most vigorous investigations for many years to come.

The subject of immunity is particularly interesting. The attention of pathologists is everywhere directed to it, and the solution of its many problems is of the utmost importance to the whole world. In this line the highest development has perhaps been attained with tetanus, but important investigations have been made with hydrophobia, pneumonia, tuberculosis, and many other diseases. After Jenner and Pasteur, who will always be associated with whatever is known of the subject, the names of Behring and Kitasato, Briege and Fraenkel, Koch, the brothers Klempner, Ehrlich, Emmerich, Tizzoni and Centanni, and many others might be mentioned for valuable, painstaking, pioneer work in this direction.

The attention of various observers has been directed lately to the possibility of the hereditary transmission of immunity against disease from parent to offspring, either directly as through the semen of the father or the ovaries of the mother, or indirectly through the absorption by the foetus of a vaccine introduced through the tissues of the mother. In the newborn, immunity may be transferred through the milk of the vaccinated mother.

In some investigations by Tizzoni and Centanni ^{v. 12, No. 3, Aug.}¹, ¹¹² on rabbits for the purpose of determining the possibility of such transmission, the following conclusions are arrived at:—

“ 1. The father can transmit acquired immunity against rabies to the offspring through the semen. 2. This occurs without any peculiar influence on the part of the mother, as the father can transmit the immunity to the offspring of different mothers. 3. The immunity thus transmitted extends equally to all the progeny. 4. The immunity of the young is less than that of the father. 5. The immunity transmitted through the semen is permanent, in distinction to that acquired through milk or injected blood, which is transitory.”

Some experiments by Charrin ⁹²⁷ _{Oct. 28, 1898} are also of interest. This observer states that in some animals, inoculated with either attenuated cultures or with the toxins derived from the bacillus pyocyanus, the products of conception were often born either dead or deformed, or in some way badly developed or enfeebled. In some instances with both parents vaccinated by the toxins, immunity against the germ had been conveyed to the offspring, while if only one parent was immunized the results were negative or at most doubtful.

Fowler, of New York, ¹⁵⁷ in a paper on traumatic fever and surgical antipyresis, speaking of the part played by bacteria in the production of primary-wound fever, says: “ At the present day the opinion is very generally held that the fever which follows the infliction of a wound depends upon soluble poisons, the ptomaines, which, acting as a pyrogenic agent, exert a general influence upon the body, either through the nervous system or through the lymph- and blood- channels. These agents may exert their influence in three ways: First, by irritation of the peripheral nerves, which, by reflex action, affect the central nervous system; second, by being taken up by the radicles of the lymph-channels, and also by the smaller veins, and thus reaching the circulation, acting directly upon the central nervous system; third, by being taken up through the last-mentioned channels, passing into the general circulation, and being transferred thence with the tissues of the body, where their presence excites an increased tissue metamorphosis.”

Of secondary-wound fever, which he describes as something quite distinct from the primary form, he mentions the symptoms

and says that in this form there is developed a chemical poison, the result of either the processes of life or the decomposing effects of the pyogenic cocci, which, in addition to the ptomaines present resulting from the action of the bacteria of putrefaction, may produce a mixed infection. The constitutional symptoms, therefore, will vary according to whether the ptomaine poisoning or the effects of the pyogenic cocci predominate. The former gives rise to more or less profound disturbances, while the latter, beyond loss of appetite and a sense of lassitude, providing proper local measures have been adopted, attracts but slight attention. Should, however, the discharges from the wound be sufficient to produce burrowing, new channels of infection are opened up, and the system becomes overwhelmed with fresh accessions to its already existing burden of sepsis.

In the treatment of septic fevers Fowler advises the well-known local attention to the wound on first suspicion of trouble and the use of supporting general measures. No antipyretic remedy, as such, is to be used under any circumstances. Mention is also made by this author of the so-called aseptic-wound fever produced by the passage into the circulation of particles of dead tissue not the result of putrefactive changes, and which go on to further destruction and oxidation without bacterial influence. This is the fever which may result from the employment of chemical antiseptics about the wound.

Ferchmire, of Kharkow,²⁸ has published a contribution on red pus from observations on fourteen cases under his care in a surgical clinic. The pus is described as having been seen in fresh wounds, usually in the first dressings. The color was of a bright light-red, easily distinguished from that of blood. A bacillus was found about as thick as Friedlander's pneumococcus and measuring about one-third of the diameter of a red blood-corpuscle. It grew best at a temperature of from 96.8° to 98.6° F. (36° to 37° C.), and retained the power of producing color through numerous cultivations. The coloring-matter was soluble in alcohol. Mice possessed immunity from the attacks of the bacillus; dogs were killed in four days, death being preceded by local œdema with high fever, but no suppuration. In the clinical cases in which it was encountered no disadvantageous influence on the healing process was observed.

Lagarde has published the results of a series of experiments conducted under Welch in the Hopkins Laboratory,¹ with the idea of determining the extent to which bullets in original packages are septic, the effect of the heat of firing on any germs carried by the bullet, and especially whether the infected bullet might, after firing, convey infection to the produced wound. The experiments were carefully conducted, and the results formulated in his conclusions, as follows: 1. The vast majority of cartridges in original packages are sterile and free from septic germs. 2. The sterile condition of the cartridges is due to the thorough disinfection and absolute cleanliness observed in the process of manufacture. The disinfection with heat, acids, and alkalies, and the rigid rules of cleanliness used in the process of manufacture, are employed to exclude grease and dirt, as the latter impair the keeping qualities of the powder and disturb ballistic values. 3. The majority of gunshot wounds are aseptic, because the vast majority of the projectiles inflicting them are either sterile or free from septic germs. 4. Cartridges out of original packages show micro-organisms upon them, and these are not entirely, if at all, destroyed by the act of firing. 5. Anthrax, when applied to the projectile of a portable weapon, is seldom, if ever, entirely destroyed by the act of firing. 6. When a gunshot wound is inflicted upon a susceptible animal by a projectile infected with anthrax, the animal becomes infected with anthrax and dies, in the vast majority of instances, from said infection. 7. The heat developed by the act of firing is not sufficient to destroy all the organic matter on a projectile, the cherished notion of three centuries and more to the contrary notwithstanding. 8. The results, as set forth, justify the assumption that a septic bullet *can* infect a gunshot wound.

An instance of rare and long-delayed lead poisoning has been reported by Küster and Lewin.²²⁸ The patient had been wounded in battle in August, 1870, a ball finding lodgment in the right tibia just under the knee. This had given him no trouble until after eighteen years, when, early in 1888, symptoms of chronic lead poisoning developed, growing more and more definite until the patient became bedridden. In 1889 the old wound was cut down upon and the leaden ball removed, after which the symptoms disappeared and the patient recovered.

TRAUMATIC NEUROSES.

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IN looking over the literature of the year on the subject of the neuroses following trauma, one must acknowledge that there has been no material advance. In France the usual number of cases with hysteroid symptoms are again reported, and support the theory that the psychic shock, and not the "commotio spinalis," is the exciting cause. In Germany, discussions concerning the presence of the narrowing of the visual fields, its diagnostic value, and the question of simulation, still continue, the larger number of neuro-pathologists being now more inclined to accept the views of Charcot. Here in America the subject has attracted less attention as compared to that of former years. Evidences of progress are now shown, in that the traumatic neuroses are being dealt with collectively.

Semeiology and Diagnosis.—In traumatic neurosis, as in every other disease, individual cases show all symptoms only in the rarest instances. In a majority of cases this advantage must be relinquished, and in spite of the lack of one or the other important symptom the diagnosis loses nothing of its intrinsic worth. With regard to pain in the back, the test by voluntary motion, by forcible motion, and by transmitted shock, as emphasized by Dercum, should be conscientiously applied. Nonne⁶⁹ relates during the year a series of observations on nervous troubles following trauma, taking the form of traumatic neuroses, as understood by Oppenheim. In one case there was hereditary nervous trouble, in another plumbism, and in a third alcoholism was the predisposing cause.

Frick²¹⁴,_{June 16} aptly remarks that it is a fruitless undertaking to seek any further for characteristic objective symptoms, the presence of which might lead one to regard them as pathognomonic of traumatic neurosis or their absence as due to simulation.

Hubscher²¹⁴,_{Oct. 15, '93} makes an interesting report of his findings in four cases, the examinations being eight months after the accidents. All four cases suffered from psychical disturbances, as well as dimness of vision and limitation of the visual fields, and in one case a difference in the frequency of the pulse on the affected side. He gives the following conclusions: 1. After injuries, and, as it appears, after railroad accidents, the symptom complex arises, characterized by psychical changes, disturbances of sensibility, and more or less disturbance of vision. 2. If all these symptoms are met with in one patient, the disease may be diagnosed, both from a clinical and practical stand-point, following Oppenheim, as traumatic neurosis. 3. In the examination of the eyes, conditions of convergency must be taken into consideration.

The symptoms in traumatic neuroses still continue to attract careful attention, and especially is this so concerning the different eye symptoms and simulation. On the whole the discussions seem to show that there is less disagreement and that simulation is not so frequently attempted as was formerly thought to be the case. This is probably due, in a great measure, to the more thorough and general knowledge of the disease, as well as to the different tests used. In fourteen cases reported by Nonne, five had narrowing of the visual fields. Nine new cases are presented by Oppenheim, in seven of which this symptom was found; but he is of the opinion that, owing to the more convenient forms of examination, it is not present as frequently as was formerly supposed. Wernicke thinks that it is a common symptom, recommending a careful examination of the fields in every case. Benedikt emphasizes the point that narrowing of the visual fields may occur long after the accident, and warns against closing legal proceedings at too early a date.

From an ophthalmological point of view, Saenger insists on the necessity of studying with care the value of this symptom, which can be caused by fatigue alone. Regarding simulation, Strümpell, while observing that the frequency of simulation cannot be absolutely ascertained, believes that this voluntary alteration of the psychic faculties seldom occurs, because it seems to him difficult for incompetent individuals to know of what psychic modifications and of what objective alterations they are to be accused.

The suspicion that the number of simulators is large always

gains ground, through the fact that many persons whose nervous systems have become diseased through trauma are disposed to exaggeration. Hitzig does not think that the study of the objective symptoms is yet sufficiently advanced. Baumler, remembering that the objective symptoms may be the result of subjective troubles, states that careful study of each case will cause simulations to be discovered. Mauthner thinks that the more traumatic neurosis is written and spoken about, the more the disease will be spread and the more easily simulated. Strümpell, Wernicke, Benedikt, and Schwartz all agree as to the rarity of simulation and the frequency of exaggeration.

Arthur Strauss⁴,_{18, 22} speaks of the value of Mannkopf's symptom and gives the results of his findings in cases in which the patients complained of painful points over different parts of the body, and also in patients who had met with accidents. In both sets of cases there was increase of the pulse in some and in others no increase. He concludes that the Mannkopf symptom is only of value when positively absent. H. Burger⁴,_{17, 22} discusses the laryngoscopic findings in traumatic neuroses, and opposes the views of Holtz, that bilateral posticus-paralysis excludes simulation. He points out that these are voluntary muscles, and therefore can be simulated. His conclusions are: 1. In traumatic neuroses, functional paresis of the abductor muscles is not improbable, although not a frequent symptom. 2. This paresis cannot be utilized in the diagnosis between traumatic neuroses and simulation. 3. Paralysis of the abductor of the glottis (M. crico-aryt. posticus) as a result of traumatic neurosis has not been described up to the present time.

Schultze regards tremor as an important symptom and one not easily simulated; a slight difference in the quality of the tremor must not be taken for simulation. Hoffmann, of Leipzig, regards the accident law in Germany as the soil upon which the traumatic neuroses have grown.

Saenger calls attention to the symptom complex of asthenopia, and states that this may occur with or without narrowing of the fields of vision. Higier⁵²⁰,₁₁₋₁₆ describes two cases which are of some interest, and arrives at the following conclusions: (1) the disease is a combination of the symptoms of hysteria and neurasthenia; (2) there is no local, but general, neurosis; (3) to the symptoms which cannot be simulated belong narrowing of

the fields of vision, Rumpf's reaction, diminution of galvanic irritability, Mannkopf's symptom, etc.; (4) the requirements of life-insurances and examinations by many physicians favor the development of simulation; (5) the examination by a specialist alone should be decisive.

M. Lebrun⁴⁵⁴ _{J.^{an}} recites an interesting case of monoplegia and hysteria. The patient, male, 18½ years of age, was examined for military duty and found to be perfectly healthy. Shortly after, while being vaccinated, he made an unexpected movement of the arm, receiving a slight wound on the left arm from the lancet which the doctor held. A few moments afterward he fell down unconscious. Three days later there was another attack, followed by clonic movements, and in the course of a week there developed headache, throbbing in the temples, noises in the ears, and globus hystericus. After removal to the hospital it was found that there was a marked paresis of the left arm, with anaesthesia, analgesia, hysterogenic zones, and narrowing of the visual fields. Treatment by hypnotic suggestion was tried, and a cure resulted in one *séance*.

Etiology and Pathology.—Notwithstanding continued investigations, the presentation of papers and reports of cases, no material advance has been made in these directions. It is now the almost unanimous opinion that the results of psychic shock are identical with those of physical shock, and that the psychic element is largely present in the apparently mechanical cases. Charcot has shown that traumatic neuroses are due not to the bodily injuries only, but to psychical and physical causes combined. C. S. Freund²¹⁴ _{J.^{an}} points out the fact that in recent times the French theory has come to be more accepted in Germany, and that Charcot's view is the dominant one. Strümpell²⁰²³ _{A.^{pr.}} believes the traumatic neuroses to be due to "commotio" outside of the mechanical disturbances; a congenital predisposition may exist for the hysteria, but generally an external factor is required to produce the result. He regards the condition as equivalent to "traumatic neurasthenia" and "traumatic hysteria." Jolly prefers the term "traumatic neurosis," in the singular, and objects to the division into several distinct groups. Schultze objects to all general grouping, and is content to apply to each case, following the conditions present, the special designation of neurasthenia, hysteria,

hypochondria, etc. Schultze believes that a direct obliteration of psychical memory-pictures of the motions and sensations is produced by the trauma, and assumes that a kind of reflex affection of the brain is produced by a condition of local irritation. C. H. Wilkinson²⁰²⁴, concludes that it is due to injury of the sympathetic system of nerves, through the perceptive centres of the brain, and is a true hypochondriasis, kept alive by morbid suggestions and evil forebodings from self and others, as well as by a lack of self-confidence and a neglect of proper exercise, both physical and mental. A. Hoffmann, of Leipzig,⁴⁰⁴ agrees with Strümpell, and proposes the name of "commotio," stating that, although the symptoms are not new, still the condition is sufficiently peculiar to demand a separate name.

The pathology of the disease still remains obscure. One autopsy has been reported during the year by Pel, of Amsterdam,⁴ in which no abnormality in the brain was observed.

Prognosis and Treatment.—The prognosis is rather discouraging, though now regarded as more favorable by the majority of authors. Schultze thinks it is variable and sometimes bad. Out of 46 cases reported by Stohr, 6 recovered. In 3 cases of Dercum's, improvement took place in 1 only. He thinks that improvement is not uncommon, but that complete recovery is rare. Ziemssen is of the opinion that a poor prognosis has a bad effect upon the course of the disease. Institutions have been recommended for these cases, and we must acknowledge that, as this prevents the patient from going from one physician to another, the diagnosis becomes more certain, and so secondarily favors the prognosis. Dercum²⁰²⁵ gave the history of a case which, after five and a half months' treatment in a special hospital, resulted in almost complete recovery.

In illustration of the long duration of the disease, Morton Prince, of Boston,⁵ places on record two cases in which the symptoms persisted twenty-eight and twenty-nine years, respectively.

With regard to treatment, nothing new has been suggested. Absolute rest after injury, and mental diversion, with light bodily exercise in the secondary stages, are the best-known means for averting chronicity and warding off an incurable condition. Baumler and Lenhartz insist on the importance of the first care. Schultze urgently warns against forced therapeutic measures. Quite a

number of cases are reported as cured by hypnotism, and an important point has been made, namely, that this should be employed as a last resort; for having tried all other remedies, without success, strengthens the auto-suggestion.

Medico-Legal Aspects.—Each year has shown a decrease in the number of malingeringers as reported by the different authors, and the positive assertions formerly made are no longer supported by the evidence before us. Strümpell, Wernicke, Benedikt, and Schwartz all agree as to the rarity of simulation, but acknowledge the frequency of exaggeration.

As we are still far from being able to decide this question, it would be better to concede the point. Charles S. Potts, of Philadelphia,¹¹² gives a very instructive report, considering especially cases in which there was no litigation. Eighteen cases are contributed; in 16 there was no litigation, and in 2 damages were awarded, but were not followed by recovery.

SURGICAL DRESSINGS AND ANTISEPTICS.

By F. VAN IMSCHOOT, M.D.,
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ANTISEPSIS AND ASEPSIS.

No other subject has occupied surgeons to such an extent as the question whether operations should be performed antiseptically, according to the method of Lister, more or less modified, or aseptically, as advised by certain German surgeons, Bergmann, of Berlin, heading the list of these. All surgeons agree in renouncing entirely the old method. The former frequent accidents, infection of wounds, septicæmia, and pyæmia, are daily becoming more rare. In my practice I do not remember a single case of septicæmia due to surgical procedures. The antiseptic method, which has been the subject of much experimentation, has incontestably produced marvelous results. In a lecture at King's College Hospital, Lister² presented a case of complicated fracture of the patella cured by suture, proving the efficacy of the antiseptic method. He gave as the principles of his method: 1. The prevention of the septic germs from entering the wound during operation. 2. The application of dressings in such a manner as to render ulterior infection impossible.

Lister still considers carbolic acid the best disinfectant for sponges. Koch seems to have exaggerated the germicidal power of solutions of corrosive sublimate. The staphylococcus pyogenes aureus, one of the most frequent causes of suppuration, is more surely destroyed by carbolic acid than by corrosive sublimate. The same is the case with the bacillus of tuberculosis. Yersin has demonstrated that this is killed in thirty seconds in a 1-to-20 solution of carbolic acid; in one minute in a 1-per-cent. solution; while it takes ten minutes to bring about the same result in a 1-to-1000 solution of corrosive sublimate. Crookshank has shown that the tuberculosis bacillus does not resist the action of carbolic acid. Lister disinfects sponges in the following

manner: they are washed in soap and water, then in a solution of sodium, again rinsed in water, dried, and finally placed in a 1-to-20 solution of carbolic acid. This same 1-to-20 solution is used to disinfect the instruments, the hands, and the field of operation. He finds this method more practical than boiling the instruments. Instruments should be cleaned with a hard brush before putting them aside. The skin of the patient is to be disinfected in the same manner. Carbolic acid penetrates well into the epidermis, and mixes readily with the fatty substance. This is not the case with corrosive sublimate. Lister has such confidence in carbolic acid that he does not consider it necessary to wash the skin with soap. During the operation the sponges are washed in a carbolic solution of 1 in 40. The wound is also washed with the same solution before the application of the dressing.

Abbott has arrived at the following conclusions: (1) corrosive sublimate only acts upon a certain number of microbes; (2) the activity of the sublimate depends upon the quantity of albuminous matter present in the same region as the microbe. Corrosive-sublimate solutions do not possess all the properties accorded to them. The albuminous substances and the secretions determine its germicidal power. Moreover, the integrity of the tissues is threatened by its application, and it thus loses a portion of its germicidal power.

Morgan Vance, of Louisville, Ky.,¹⁹ has obtained equally good results from the use of sterilized water alone. When disinfection, as indicated by Lister, is not possible, sponges and silk well boiled may be used, and the instruments, sponges, and cloths used during operation cleansed with boiled water. Only such ligatures as those not easily infected, such as Florence silk, horse-hair, etc., should be used. Dry dressings are greatly to be preferred to wet ones.

Arbuthnot Lane,^{18, 19} recommends the energetic tamponing of cavities in the bones with gauze saturated with a carbolated solution of 1 in 20, mixed with a certain quantity of iodoform; in this way he obtains a perfect antisepsis. Frederick Treves,^{6, 10} advises the use of iodoform powder in intra-abdominal operations, citing several cases (nephrectomy, abscess of the liver, etc.) in which he made use of it. According to Lister all good dressings should present four important qualities: (1) they must contain some good

antiseptic certain in action; (2) this action must last until the renewal of the dressing; (3) it must not be irritating; (4) it must absorb all the secretions from the wound.

Carbolic acid is volatile and irritating; corrosive sublimate is more lasting, but is an irritant; the albumen of the blood-serum of the horse combined with corrosive sublimate is less irritating, but is difficult to prepare. The best preparation is the double cyanide of mercury and of zinc. This salt is but slightly irritating, and but little soluble in blood-serum. Its action is lasting, the wounds cicatrizing without the slightest irritation. It is of sufficient antiseptic activity and prevents putrefaction. Only half the usual quantity of corrosive sublimate employed is needed to obtain the same results. An interesting experiment clearly demonstrates its activity: A glass tube is filled with gauze saturated with a 3-percent. solution of the salt of mercury and zinc; some serum and red corpuscles of the blood of a hog is placed in contact with the gauze, a drop of septic serum is inoculated at one end of the tube, the whole being maintained at the temperature of the body while preventing evaporation. After five days the gauze did not emit any odor, and it was impossible by the aid of the microscope to perceive any development of bacteria. Unprepared gauze was treated in the same manner, the development of bacteria being noticeable after twenty-four hours.

In the study of antiseptics, the bactericidal power of a given substance and its activity in preventing the formation of micro-organisms must always be considered. These two properties of antiseptics are far from being proportionate. Thus, corrosive sublimate has a much greater germicidal power than the cyanide of mercury and of zinc; on the other hand, the latter prevents the development of germs. The use of gauze disinfected by means of a solution of bichloride of mercury should be avoided, for the combination of the bichloride with the double cyanide gives rise to a product highly irritating to the skin. Moreover, a portion of its activity is lost. The double cyanide is very irritating to the olfactory organs. Lister remedied this defect by mixing with it a certain quantity of hydrochlorate of mauveine. Ernest Maylard,² objects to the boiling of sponges, as they turn brown, contract, and become as hard as wood when dry.

O. Lang and A. Flach¹⁶⁹ conclude that the irrigation of

wounds by means of a solution of corrosive sublimate does not prevent the development of bacteria; on the contrary it diminishes the power of resistance of the wounds against the micro-organisms. The results obtained with dressings of corrosive-sublimate gauze and with sterilized gauze were very different. Even after twenty-four hours bacteria were found when the sterilized dressing was used; they were more rarely found with the corrosive-sublimate dressing, and only once in ten times with the iodoform dressing. The latter should therefore be chosen when the dressing must remain in place for several days. The authors minutely described the mode of procedure adopted by Kocher at the Berne clinic.

Curtis⁸⁵ insists most energetically upon the necessity for the most minute precautions in the disinfection of the hands, the nails, the field of operation, instruments, etc. G. H. Hume² also is of the opinion that the infection of wounds occurs most frequently through the hands, sponges, etc., and that it is of the greatest importance to be entirely conversant with the technique of the procedure. Nowadays we no longer speak of "laudable pus," the first desideratum being the prevention of the formation of pus and the healing of the wound by first intention. Julius A. Faison has renounced the use of corrosive sublimate at the Johns Hopkins Hospital. All dressings are sterilized by heat. The hands of the operator are first brushed and washed with soap in warm sterilized water, and afterward in a 1-in-16 solution of permanganate of potassium, then in a 1-in-8 solution of oxalic acid. The instruments are sterilized by steam (Arnold's apparatus) or in a boiling-hot 1-per-cent. solution of sodium. The instruments are handled only by assistants wearing disinfected rubber gloves. The wounds are covered with the following powder: subiodide of bismuth, 1 drachm (4 grammes); boric acid, 8 drachms (31 grammes). The peritoneal cavity is washed out with 4 litres (4 quarts) of sterilized water, at a temperature of from 110° to 112° F. (43.3° to 44.4° C.); drainage according to Mickulicz; sterilized garments for operators and assistants.

Trambusti⁸⁷⁶ studies the degree of resistance of different micro-organisms (chicken-cholera, pneumococcus of Friedländer, staphylococcus pyogenes aureus, etc.) to various solutions of corrosive sublimate, 1 to 40,000, etc. Friedländer's pneumococcus became accustomed to a 1-to-2000 solution; chicken-cholera did

not resist a 1-to-30,000. Micro-organisms have the property of becoming accustomed to various antiseptics, the power of resistance gradually augmenting. Some few preserve almost indefinitely their pathogenic properties ; others lose them rapidly.

The Faculty of Medicine of Madrid²², have recently inaugurated an operation-room, which is, to say the least, decidedly original. The operator and his assistants are separated from the spectators by an actual wall of transparent glass. At the Val de Grace Hospital, Paris,²⁴³ a series of experiments were made concerning the value of antiseptics used for dressings. No bichloride bandage or dressing, nor any charged with lysol, iodoform, or salol, was found entirely exempt from germs. Only those prepared with carbolic acid possessed antiseptic properties. This does not imply that all other dressings should be rejected, since experience proves that the results obtained with the others are brilliant and encouraging.

The partisans of the antiseptic method are still very numerous. The results obtained in operations by Morris⁴⁶² are among the most remarkable. In the fourth series of one hundred operations, osteotomies, resections, osseous sutures, intra-abdominal operations, etc., the mortality is very small.

Spencer Graves³⁶⁴ quotes several cases of conservative surgery which, thanks to antisepsis, were satisfactory in result, as were those at the clinic of Winiwarter.²⁹³ Bergmann, of Berlin,⁸⁰ may be regarded as the chief representative of asepsis. This method consists, above all, in a superabundance of preventive measures ; complete sterilization of all objects used for dressings and of everything destined to come near the wound. The operating region is prepared as usual. Catgut from which the fatty matter has been removed by immersion in ether, and which is then preserved in a 1-to-1000 solution of corrosive sublimate and alcohol, is used for the deep-seated sutures ; Florence silk is reserved for sutures of the skin. The dressing consists of iodoform and sterilized gauze. Injections of iodoform in glycerin are used in tuberculous arthritis. Hahn has had very satisfactory results (25 per cent.). Bardeleben uses a 6-per-cent. solution, with recovery in 5 per cent. of the cases. Bergmann was only obliged to resort to operative measures five times in twenty-five cases, although Israel, of the Juden Spital, claims never to have seen a cure by this method, there being, at best, but some amelioration. All objects

used for dressing are sterilized in Schimmelbusch's oven. The operations and the dressings are entirely by the dry method. Sponges are completely abandoned; only sterilized gauze is used to dry the wounds and to stop the flow of blood. Schlange has shown, at Bergmann's clinic, that an absolutely dry state of the wound is unfavorable to the development of germs, and, therefore, the evaporation of the secretions of the wound should not be hindered by the application of rubber cloth, gutta-percha, or any other impermeable substance. This method agrees with laboratory experiences. We see that cultures on gelatin or on agar are lost the moment that their moisture disappears. Dressings containing antiseptics, as carbolic acid, corrosive sublimate, etc., lose their antiseptic principles rather rapidly by evaporation.

The methods of disinfecting catgut are various. Bergmann uses alcohol with corrosive sublimate and ether, Macewen chromic acid, and Lister carbolic acid. Reverdin resorts to steam for the removal of the fatty matter, for dehydration and sterilization; Kocher uses oil of juniper, while Bruns advocates xylol.

As regards drainage, it is secured by simple solution of continuity in the tissues, by the use of drainage-tubes, or by substances exerting a capillary action. Neuber invented "resorbable" tubes. Trendelenburg and Macewen make use of decalcified bone; Watson Cheyne, catgut-fibres. Glass tubes are also used, and are easily sterilized. Frank J. Thorburn⁹⁴⁶ has made a very complete study of the progress of asepsis.

Hochenegg, of Vienna,⁵⁷ determines whether dressings are in reality sterilized by coloring them with the following: Solution of acetate of aluminium, 150 grammes ($4\frac{1}{2}$ fluidounces); water, 150 grammes ($4\frac{1}{2}$ fluidounces); alizarin paste (20 per cent.), 5 grammes ($1\frac{1}{2}$ drachms). When this solution is first applied it is of a brown color; when sterilized in an oven at a temperature of 100° C. (212° F.) it changes to a bright red.

Schimmelbusch, of Berlin, at the Congress of German Surgeons,⁴¹ gave an account of experiments undertaken by himself to determine the activity of antiseptic substances, both on dead matter, such as culture bouillons, silk thread, as well as upon living sores. They were made upon mice, a wound in the tail being infected with liquids taken from animals having died of anthrax. Immediately after inoculation, the wound was irrigated

with a 10-per-cent. solution of corrosive sublimate. All the mice succumbed. A second series showed the same results. Trials were then made of other substances, a 5-per-cent. solution of carbolic acid, chloride of zinc, creolin, a 10-per-cent. solution of potassium, saltpetre, boiling water, etc.; but always with the same result. These experiments prove that substances possessing an energetic microbicide power in the reaction tubes have no action upon the wounds. This anomaly may be explained in various ways. The albuminoid substances of the blood and the products of secretions from the wounds modify the action of the antiseptics and render them inert; practically speaking, it is impossible to bring the substances in intimate contact with all portions of the wound. It may be, also, that the germs penetrate very rapidly into the tissue, and thus render the antiseptics inefficacious. The rapidity of absorption has been very variously estimated. Renault and Guy inoculated horses and sheep, and cauterized the inoculation wounds ten minutes after with red-hot irons. All of the animals succumbed. Collin inoculated anthrax into the ears of guinea-pigs, and then amputated the ears at their base. If the amputation was performed a few minutes after the introduction of the virus, the results were negative. Niessen showed that the amputation of a member two or three hours after the inoculation could no longer save life. Schimmelbusch amputated the tails of the mice and demonstrated that if more than ten minutes had elapsed since inoculation the animal succumbed to the infection. If absorption throughout the organism occurs thus rapidly, it may be logically admitted that the germs penetrate too rapidly into the cellular interstices for antiseptic substances to exert their action.

Max Jaffé^{4,14,15} discusses the hospital arrangements made by Neuber, and of the difficulty of securing them everywhere. Neuber's plan is as follows: There are four hospitals; two separate barracks; a room for undressing the patient; an ambulance; an examination-room; an operating-room for operations upon healthy tissue, another for operations upon chronically-diseased tissue, still another for septic operations; a room for the examination of genito-urinary and rectal affections, a waiting-room for orthopædic patients, and an examination-room for these cases. The floor of the operating-rooms is of marble; the walls and ceilings are covered with enamel-paint; the instruments are placed upon glass tablets or trays;

the irrigators are carried on in glass stands ; there are four separate bath-rooms ; the air coming from the exterior is sifted in order to prevent, as far as possible, the entrance of any germs into the operating-rooms. This organization is certainly admirable, but is also certainly not indispensable, or even necessary. Asepsis may perfectly well be practiced in a single operating-room, the only condition necessary being scrupulous cleansing and care. The instruments should be boiled in a 1-per-cent. solution of sodium, the articles used for dressings sterilized in an oven. Neuber also insists that the operations be performed as rapidly as possible. Jaffé does not consider this rapidity necessary from an aseptic point of view. He endeavors, above all, to obtain union by first intention. He only resorts to tamponing of the wounds in cases of acute septic processes, and for operations in the immediate vicinity of the natural orifices of the body. The results obtained by this simple process have been very good. Only one patient succumbed to septicæmia during a period of four years. Jaffé advises that dressings be changed as seldom as possible. He has completely abandoned the use of iodoform on the lines of suture. The first dressing remains in place from ten to fourteen days, sometimes for four weeks, and frequently until complete recovery.

We may also here mention the mode of procedure adopted by Neuber for the suture of the wounds ; the latter are tamponed with sterilized gauze ; the skin is sutured throughout the entire length of the incision, leaving only two small openings of one and a half centimetres. Before removing the compresses the edges of the wound are strongly compressed with boiled sponges rolled in septic gauze ; the gauze is then withdrawn from the wound, which is thus left perfectly dry and its various parts in apposition. The method does not present much advantage over the compression method of Volkmann.

As regards scalpels, bistouries, etc., it was generally thought that the immersion of these instruments in a strong solution of carbolic acid would suffice, but this belief has proved erroneous. It was also thought that boiling in a solution of sodium would purify them. Otto Ihle, of Dresden, ^{Aug. 12}³⁹⁴, claims that such is not the case, and that they are cleansed not by the boiling, but by the shock transmitted to them by the boiling water and the friction caused between them by the latter. In order to avoid this fric-

tion of the instruments Ihle has constructed a metallic box in which the knives are held by racks. The bottom and the lid of the box are pierced by holes. The box is plunged into the sterilizing apparatus. A similar box was constructed for the disinfection of the needles.

Nuel, of Liége,²² advises the boiling of ophthalmic instruments for the purpose of sterilization.

Wagner³³⁶ studies the question as to whether asepsis is practicable in military surgery, upon the field. *A priori*, its application would appear difficult; nevertheless, satisfactory results may be arrived at. He indicates a series of means which render asepsis possible.

INDIVIDUAL ANTISEPTICS.

Ammoniacal Vapors.—Von Rizler,² after a series of experiments, claims that dry ammoniacal vapors exert a most-marked microbicide power.

Essences.—Lucas-Championnière²¹² has experimented with the essence of cinnamon as an antiseptic. It is but little soluble in water, and irritating to the skin; rendered soluble by retinol, a solution of 1 per cent. losing its irritating action and retaining its antiseptic properties. The rectified essence of cinnamol is more active. An ointment composed of cinnamol, retinol, and wax hastens the cicatrization of wounds. Conclusive experiments have been made with the essence of verveine and of geranium.

Cresol.—Gruber²² considers cresol less dangerous than carbolic acid, while its antiseptic action is powerful. A mixture of potassic soap and cresol forms *lysol*, a good antiseptic, particularly applicable in gynæcology; it is slightly caustic and but little dangerous. *Salutol* is a mixture of cresol and of soda, and is a good antiseptic, while *saprol*, a preparation of carbolic acid and paraffin, is an efficacious deodorizer. As cresol renders the instruments slippery, it may be replaced by *solveol*, a mixture of cresol and of creasote.

Carbonic acid at high pressure, according to Sabrazès and Bazin,⁷⁰ is in nowise a microbicide, even at 90 atmospheres, contrary to the statement of d'Arsonval.

Electrozone.—A. E. Wolf, of New York,⁷¹ made some experi-

ments showing the disinfecting action in ophthalmic practice of electrozone, produced by electricity in sea-water or salted water.

Mercurial Vapors.—According to Sabrazès and Rivière,¹⁸⁸ the action of mercurial vapors on the *coli* bacillus is *nil* while the saturation of the region is incomplete; their action is only appreciable in air-tight rooms. Clinical application can hence only be made in hermetically-closed places. Auché and le Dentu do not admit the efficacy of this method of disinfection.

Alumnol.—Eraud²² states that alumnol is highly soluble in water; it may be used as an ointment; it has no odor, and is unirritating. It is only slightly soluble in alcohol or ether. Therapeutically, it has been used in cutaneous affections and gonorrhœa. It is useful in inducing cicatrization, both in specific and non-specific sores.

Oxynaseptol, or *diaphtherin*, recommended by Emmerich, having been tried by Hamecke⁴¹ in a number of surgical cases, proved very efficacious. It is antiseptic and non-caustic. Kronacher generally uses it in a 1-per-cent. solution.

Europhen.—Tasinski, of Warsaw,⁵²⁰ used europhen for the dressing of tuberculous wounds and ulcers. It takes the place of iodoform, and is obtained by the action of iodine upon isobutyrylorthocresol. It is a yellow, amorphous powder, having the odor of saffron; is insoluble in water or glycerin; more soluble in ether, alcohol, chloroform, and oil. It adheres well to the skin and to the wound, and is not toxic. It has been used as a powder, and in the form of an emulsion in glycerin.

Thiuret.—Blum⁶⁹ mentions this new antiseptic, a product of the oxidation of phenyldithiobiuret,— $C_8H_9N_3H_2 + O = H_2O + C_8H_7N_3S_2$; it is slightly basic; is a crystalline, inodorous powder, insoluble in water, soluble in alcohol and in ether. Cultures of the bacterium *coli*, the typhoid, *pyocyaneus*, diphtheria, chicken-cholera, *staphylococcus pyogenes albus*, and the *bacillus prodigiosus* are rendered sterile by it. Thiuret is only slightly toxic. It has not been tried upon man.

Formaldehyde—*Formaline.*—Blum³⁴ states that the 40-percent. solution of formaldehyde was studied by Loew from both the physiological and the antiseptic points of view. This antiseptic, according to Trélat, Berlioz, and Aronson, acts in solution and in the form of vapor. According to Stahl, this agent, to which he

gave the name of formaline, possesses considerable microbicide power. Blum, after a number of experiments upon the bacilli of chicken-cholera, staphylococcus pyogenes aureus, anthrax, and other bacilli, has reached the following conclusions: Formaline, even in concentrated solutions, kills micro-organisms very slowly; weak solutions serve to prevent decomposition and the development of germs. The toxicity of the product is not great.

Peroxide of Hydrogen.—Pierce¹³⁸ finds that peroxide of hydrogen acts as a detergent upon the surface and upon suppurating cavities. In cases in which the pus is not removed by irrigations, peroxide of hydrogen decomposes it and causes it to rise in the shape of bubbles of gas. It is very active in ulcers, gangrene, chancres, fistulous tracts, empyema, etc. Its disinfecting power is particularly noticeable in gangrenous ulcers. It must, however, be used when fresh; when the atom of oxygen is lost, the peroxide becomes quite as inactive as ordinary water.

Fluoride of sodium, according to Blaizot,¹⁴ is sixteen times less toxic than corrosive sublimate and sulphate of copper; twice less toxic than carbolic acid; 1-per-cent. and even $\frac{1}{2}$ -per-cent. solutions prevent the development of pyogenic bacteria. These solutions are useful for the disinfection of the skin, of the mucous membranes, and the hands of the operator. Iron and steel are corroded by it, nickel more slowly. It would prove useful for dressings for wounds and for the treatment of certain dermatic affections,—erythema, impetigo, prurigo.

Ichthyol; Sulph-ichthyolate of Ammonia.—Ichthyol⁸⁰ is much used in Germany in the form of unguents and solutions. Sulph-ichthyolate of ammonia is a thick, dark-brown, greasy substance having a pronounced odor of tar; it is soluble in alcohol, ether, water, and all fatty substances, and appears to be but very slightly toxic. It has an astringent action on the vessels.

Soziodol.—Spirig⁵⁸ states that soziodol, a derivative of phenol, prevents the development of bacterial cultures. Utilizing thin blades of glass, partially covered with the bacteria culture, he obtained the following results: The spores of anthrax were killed by corrosive sublimate at 1 per cent., in twenty-six hours; by mercurial soziodol at 1 per cent., in twenty-six hours; by sodic soziodol at 8 per cent., in three days; by soziodol and zinc at 4 per cent., in three days; by soziodol and potassium at 1 per cent.,

in eight days; by soziodol and lithium at 1 per cent., in eight days; by soziodol and alum at 1 per cent., in ten days; by soziodol and sodium at 2 per cent., in twelve days. The bacilli of anthrax (twenty-four hours in bouillon at 37.5° C.—99.5° F.) by corrosive sublimate at 1 per cent., in fifty minutes; by soziodol and mercury at 1 per cent., in forty minutes; by the other preparations, in eight hours, sixty hours, and seventy-two hours. The bacillus of anthrax (six hours in bouillon at 37.5° C.—99.5° F.) by corrosive sublimate at 1 per cent., in five minutes; by mercurial soziodol at 1 per cent., in five minutes; for the other combinations the time varied between twelve hours and twenty-four hours. The staphylococcus aureus was killed in six hours by the following solutions: Corrosive sublimate at 1 per cent., mercurial soziodol at 1 per cent., soziodol and sodium at 2 per cent., soziodol and zinc at 2 per cent., soziodol and alum at 1 per cent., soziodol and lithium at 1 per cent.; and by soziodol and potassium at 1 per cent., in twelve hours. The typhus bacillus was killed in fifteen seconds by corrosive sublimate at 1 per cent., by mercurial soziodol at 1 per cent., and by the other combinations in one hour and two and one-half hours.

These experiments show that preparations of soziodol will kill the bacteria when these are easily reached by the disinfecting substance. Another series of experiments was made upon bacteria from other culture media, showing that preparations of soziodol are capable of killing the bacteria even in the culture media. The mercurial preparation is the most active. The advantages of soziodol are: absence of odor and of irritation of the tissues; its slight solubility, and consequent prolonged action; the diminution of the secretions; the absence of toxicity, even in large doses.

Izol.—Bruce Clarke,⁶ has tried izol, first experimented with by Klein, who found it to possess an energetic disinfectant power, to be unirritating, and not toxic. The solution used was, first, 1 in 100, and later 1 in 200. The microbes exposed to its action lost their vitality in five, ten, or fifteen minutes. Carbolic acid was chosen as a point of comparison. A solution of 1 in 200 was found to suffice for the destruction of micro-organisms. Clarke prepared a solution of 1 in 50, this being diluted to 1 in 200 at the time of use. The sponges were cleansed in a solution of sodium, rinsed in water, and kept in a solution of izol of 1 in 200 for at

least twenty-four hours before the time of using. The gauze used for dressings was the ordinary gauze of commerce, boiled for twenty minutes and steeped in a 1-in-200 solution of izol. At the moment of use it was wrung out and applied directly to the wound in a moist condition, the whole being then covered with cotton wadding. The instruments were immersed in the solution for fifteen minutes. The hands were disinfected in the usual way. Clarke makes use of the smallest possible number of ligatures, which he considers as hindrances to cicatrization. Hæmostasis was induced by torsion. According to the author, izol, when used upon fresh wounds, fistulous tracts, mucous membranes, etc., is more active than the disinfectants already known. It irritates neither the hands of the operator nor the skin of the patient.

Pyoktanin.—Leonard B. Almy²⁰⁴ finds that pyoktanin does not arrest the purulent secretion in vertebral caries and in pyosalpinx, but noticeably diminishes the quantity of pus in the majority of cases, and reduces the risk of septic infection. He particularly recommends it in affections accompanied by suppuration.

Creolin.—G. A. Fackler⁴²⁶ recommends the use of creolin, a product obtained by the distillation of tar. It forms a whitish emulsion with water. This solution gives a slightly alkaline reaction ; the best emulsion is that made in the proportion of 2½ per cent. It is for the disinfection of the hands, the operating-room, and instruments. A ½-per-cent. solution keeps wounds aseptic. It is a deodorizer and an inoffensive disinfectant, very useful in obstetrical practice. It is much to be recommended for the irrigation of suppurating cavities, such as the bladder, the pleura, etc., in doses of 1 per cent.

Camphorated carbolic acid has been found, by S. W. S. Toms,⁵⁹ very active in its effect upon ulcers.

Steresol, an antiseptic varnish described by Berlioz,^{212; 80} is composed of:—

Purified shellac,	270 grammes (8½ ounces).
Benzoin soluble in alcohol,	:	:	:	10 grammes (2½ drachms).	
Balsam of Tolu,	:	:	:	10 grammes (2½ drachms).	
Crystallized carbolic acid,	:	:	:	100 grammes (8½ ounces).	
Essence of cinnamon,	:	:	:	6 grammes (1½ drachms).	
Saccharin,	:	:	:	6 grammes (1½ drachms).	
Alcohol, in sufficient quantity to make	:			1 litre (1 quart).	

This varnish is very useful for wounds to which no dressing can be applied.

Hot Water.—Reclus¹⁷ states that water at 42° C. (107.6° F.) is aseptic, for it prevents the development of germs; at 80° C. (176° F.) it kills the microbes; at 50° C. or 55° C. (122° or 131° F.) it is a weak antiseptic. Reclus uses water at 50° C. (122° F.) during his operations; it does not shrink the tissues, and carries off the detritus and clots; it is also hæmostatic. Water at 55° C. (131° F.) has a most favorable action upon atonic wounds, and hot-water irrigations favor rapid cicatrization.

HÆMOSTATICS.

Neuber⁴¹, finds that a moist band five centimetres wide and from three to five metres long suffices to insure hæmostasis. The parenchymatous hæmorrhage which follows the removal of the bandage is quite insignificant; intense redness is caused, but this only lasts from ten to fifteen minutes. Neuber's technique consists in the elevation of the member, after which a wet bandage is applied and drawn tightly, beginning at the extremity of the member. At the point where the tourniquet is to be applied he wraps the member with a strip of from three to five metres in length in such a manner that the alternating upward and downward turns of the band half cover each other. The band is fixed in position by two turns very tightly drawn. When the diameter is large, an elastic tourniquet should be used. After use the band should be well soaped, put into boiling water and afterward dried. Bardeleben prefers to apply the bands dry, and to wet the whole after it is in position. The compression obtained is perfect. For hæmostasis on the field he prefers the old style of tourniquet, without cushion.

Senn,⁵⁹ in an article on the disadvantages of too prolonged and too energetic elastic compression, declares that ischæmia may be assured by simple elevation of the member. Esmarch, in a letter written to Senn and published by him, discusses the opinions of the latter. He recognizes that he is not the inventor of elastic compression, which was devised by Silvestri. He has been using this method of compression since 1855, not knowing that Brunninghausen had done the same thing in 1818. The principle of his invention does not consist in the use of the elastic bandage, instead of digital pressure or that of the tourniquet, but rather that the elastic compression of a member might be

utilized not only in amputations, but for all operations upon the extremities; this compression admits of operating without loss of blood.

Esmarch does not admit the fact that compression is not only useless, but also injurious. It is dangerous in those cases in which there is suppuration; here it is always necessary to elevate the member before applying the compression; the same is true in soft malignant tumors. According to Esmarch elevation is not equal to compression in cases of osseus necroses, osteotomies, operations for pseudo-arthroses, luxations of old standing, extirpations of fibromata, lipomata, etc.; plastic operations, operations on the nerves, tendons, the ligature of arteries, aneurisms, resection of articulations. The accidents observed after prolonged compression, such as gangrene of the edges of the wound, slow cicatrization, paralysis, etc., are only attributable to a too violent compression. Esmarch always applies the tourniquet high up, avoiding the regions where the nerves and tendons are very little protected by the muscles.

With regard to duration, Esmarch states that he has practiced elastic compression for two hours and over without any accidents. According to the experiments of Cohnheim, the circulation may be arrested for from six to eight hours in warm-blooded animals. Edema above the point of compression becomes impossible when the arteries have been well compressed.

Senn is the first to recognize the full value of Esmarch's invention; but he, nevertheless, maintains his own opinion with regard to the paralysis consequent upon compression, of which he has observed several cases. He admits the fact that profuse parenchymatous haemorrhage and gangrene of the edges of the wounds and of the flaps are most frequently attributable to an improper application of compression.

H. Manley¹⁷⁶ divides haemorrhage into two classes, venous and arterial. The remedies for the former may be grouped into the four following classes: (1) position and repose; (2) compression; (3) astringents; (4) ligature. The venous circulation is always rather slow, and is influenced by gravity. The patient should always be placed in the dorsal decubitus in a cool room. Repose and the recumbent position are often sufficient when there is rupture of the saphenous or of haemorrhoidal veins, or venous

hæmorrhages of pathological origin. Moderate compression always arrests the latter. Care must be taken not to arrest the arterial circulation. Astringents are rarely used. Very hot water should only be used when other means do not succeed, as it impairs the vitality of the tissues; cold applications are to be preferred. Ligation is seldom necessary, except in amputations; in rare cases it may be of value.

Wright⁵⁹ describes a styptic prepared from the thymus gland of the calf, with 1 to 2 per cent. of carbonate of sodium and 5 grammes ($1\frac{1}{2}$ drachms) of chloroform per litre (quart); it is advisable to slightly acidify the solution, in order to prevent the precipitation of carbonate of calcium. The styptic entirely arrests hæmorrhages; it is rendered aseptic by boiling with a certain quantity of alkali, in order to prevent the albumen from being precipitated. Ebullition greatly diminishes the styptic power. This styptic was first described and studied by Wooldridge, Arthur, and Pagès.

R. H. Dawbarn recommends injections of salt water in pathological hæmorrhages. Boiled water is employed, and salt added in the proportion of 6 in 1000. An ordinary Davidson syringe is used, and a large hypodermatic needle, if possible, and a sound or a bit of rubber drainage-tube. The femoral artery should be found, and the needle inserted; when a little arterial blood shows itself at the orifice of the needle, the sound or the tube should be slipped upon the needle, the tube being already adjusted to the syringe by means of a very tightly drawn thread; the solution of hot water is then very slowly injected into the artery. Care must be taken not to admit any air into the vessel. This process is evidently much more rapid than that of looking for a vein after incision. The objection which might be made, that of wounding an important artery, is not admissible, since even aortic aneurisms are treated by the insertion of a number of needles.

There need be no fear of injecting the fluid too rapidly, and thus causing a cardiac syncope, because the resistance felt in making the injection is such that one would readily suppose the needle to be obstructed by a clot; the injection penetrates very slowly, it being only possible to inject a half-pint ($\frac{1}{2}$ litre) of the liquid in a half-hour. Gravity may also be utilized, the liquid

being pushed into the artery if the reservoir is placed at the height of about six feet. When placed lower down, the arterial pressure will still be sufficient to cause the blood to flow back into the needle. The water used should be as warm as can be borne by the hand,—say, about 49° C. (120° F.); the albumen of the serum does not coagulate under 72° C. (161.7° F.), and the globulin at 70° C. (158° F.). This procedure may be of service after shock from chloroform or shock due to the operation. Dawbarn has made a number of experiments on dogs, and has used the method in the case of a female patient. Once the pulse reappears and the cardiac action grows stronger, another pint of salt water may be injected into the cellular tissue. Injections of salt water have also been used, in cases of post-partum haemorrhage, at the Maternity of Dresden.

SHOCK.

Darby¹⁰⁷ _{Apr.} read a paper on this subject before the Association of Central Railroad Surgeons, at Savannah, with especial reference to shock following railroad accidents. James Evans^{10, 19} expresses about the same theories as Darby. Packard¹³⁹ _{Dec., '92} states that before the introduction of anaesthesia into surgery the pain caused by an operation was frequently the cause of shock. The pain is prevented by the use of chloroform or ether, but the shock is not avoided, sometimes the narcosis itself being the cause of shock. Rapidity of operation is not regarded as an important factor, and the patient is sometimes kept anaesthetized during a very long time, the wounds often inundated with boiling water or antiseptics, the unconscious patient being placed upon a table and exposed to cold.

A very excellent preventive measure is the injection of 0.01 grammie ($\frac{1}{6}$ grain) of morphine an hour or half an hour before the operation. Smith even advises the administration of stimulants mixed with milk every two hours for eight or ten hours. It is preferable to give only liquid nourishment, in small quantity, the day of the operation. The constitution and temperament of the patient should be considered, and he should not be uselessly exposed to cold or dampness; neither should time be lost during the operation in explanations or demonstrations. The quantity of the anaesthetic administered should be as small as possible, and

the operation performed as quickly as possible, the suture well made, and the dressing applied immediately. Urgent operations, performed during shock, often have a fatal termination. Inhalations of ether have given good results. If the pulse become weak and irregular, the ether should be immediately discontinued.

DRAINAGE.

Robert Johnson¹⁵⁰ cites a dozen cases treated by Schede's method (formation of a blood-clot) with successful results. This method was first used to fill the empty spaces left after sequstrotomies. Many surgeons prefer to have the wounds as dry as possible. Chambers considers that the blood-clot is less dangerous than the presence of a drainage-tube. Johnson says that the blood has no germicide properties, but that it is a method which permits of the filling up of empty spaces, as well as the suppression of the drainage-tubes, which is an advantage.

Roos¹⁵¹ does not practice drainage in operation wounds upon healthy tissue, nor in recent lesions. He avoids compression by a tight bandage, and contents himself with painting the line of suture with iodoform collodion. He treated by this method four amputations at the thigh, hernia (radical cures), strumectomies, castration, etc.,—twenty-seven cases in all. Among the cases fully and entirely sutured and covered with a simple antiseptic dressing were amputations of the breast, resection of the knee, the hip, etc.,—forty-eight cases in all. Cure always resulted. Roos states that for a wound well sutured a coating or crust of iodoform collodion forms the best occlusive dressing. The author claims that drainage of healthy wounds should be abandoned; when any trouble is anticipated during recovery, the best method is to tampon the wound with iodoform gauze and to make a secondary suture.

Rolla¹⁵² shares Welch and Halstead's views on the use of drainage-tubes:—

1. They allow the micro-organisms to escape the bactericide action of the living organic tissues and liquids.
2. The bacteria may penetrate into wounds beside the drainage-tubes.
3. The necessity of renewing the dressings, where there is drainage, augments the danger of infection.

4. The tube prevents union of the tissues by first intention, and the presence of a foreign body increases the secretions.

5. The tube once removed leaves an open track sometimes difficult to cure; moreover, in removing it a portion of the granulations, which form a barrier to the entrance of the germs, are destroyed. When a wound is aseptic, drainage is useless. When there is danger of infection, drainage insures the entrance of the aseptic substances.

Cartledge⁹, states that in order to suppress the use of the drainage-tube it is necessary to be absolute master of the anti-septic or of the aseptic method. If it is impossible to moderate the sero-sanguineous secretion, drainage is more sure than sterilization. When drainage is employed, the tube should be removed after from twenty-four to sixty hours. For smaller wounds it is better to have recourse to capillary drainage by means of absorbent substances, preferably catgut. Where haemostasis is desired, together with drainage, the bands of muslin with corrosive sublimate (Mickulicz) are of service. Drainage is necessary in cavities of large dimensions. The secondary suture of Kocher does not appear to present any advantages over drainage.

Lanphear¹⁰¹ protests against the assertions of Paquin and of Klemm, that where catgut is used for sutures there will be suppuration. Lanphear has made numerous experiments and declares that if the hands, the instruments, and the operating region are perfectly sterilized the use of sterilized catgut cannot give rise to suppuration. Carbolized catgut is unreliable. He prepares his catgut in the following manner: Solid, flawless catgut is washed in water and soap, then dried upon a towel; afterward wound upon the fingers and placed in sulphuric ether for forty-eight hours; then into oil of juniper for from two to seven days, according to the thickness of the thread; it is then wound upon spools and preserved in 90 per cent. of alcohol and 10 per cent. of oil of juniper, the bottle being well corked. All these manipulations should be made with the hands rendered surgically aseptic.

Estor and Moitessier³¹, have drawn the following conclusions from their experiments with ligature threads:—

1. The boiling of catgut ligatures at 108.5° F. (42.6° C.), in a saturated solution of sea-salt, no more diminishes their solidity than does simple boiling water, while it disinfects them better.

2. Boiling in 40-per-cent. glycerin and 10-per-cent. water for ten minutes, at 126° F. (52.2° C.), without any special apparatus, causes equally perfect disinfection as with the autoclave. Ligatures thus sterilized lose but little of their resistance, and may be used directly. The glycerin with which they are impregnated may be removed by placing them in a 1-per-cent. solution of corrosive sublimate, while at the same time the ligature is preserved in a perfectly aseptic condition.

Charles Dowd⁵⁹ states that heat and chemical action are considered as the best means for rendering catgut aseptic; but it cannot be boiled in water nor exposed to steam without becoming too weak. Dry heat is difficult of application.

George R. Fowler, of Brooklyn has found that catgut boiled in alcohol at a temperature of 79° C. (174° F.) was well sterilized and at the same time rendered stronger. Hodenpyl has made experiments with the following results:—

1. Fragments of non-sterilized catgut planted in various sterile media caused the formation of colonies of bacteria.

2. Catgut boiled in alcohol at 95° C. (203° F.), during five minutes, generally remained sterile.

3. Catgut boiled in alcohol for one hour always remained sterile.

4. Fragments of catgut placed for twenty-four hours in bouillon cultures of the streptococcus pyogenes, staphylococcus pyogenes aureus, bacilli and spores of anthrax, and afterward boiled in strong alcohol for various periods of time, dried and placed in sterile culture media, showed, after fifteen minutes' boiling, that asepsis was incomplete; after thirty minutes the catgut remained sterile, except in the case of anthrax; after forty-five minutes, and one hour, asepsis was absolute. This catgut was used with success for two years in different hospitals.

Boiling in alcohol is difficult, as in the open air it evaporates very rapidly. Dowd proposes a special apparatus for sterilizing the catgut without loss of the alcohol. The catgut being greasy, the boiling alcohol dissolves the grease, and therefore favors the destruction of the germs.

Vigezzi⁵⁸⁹ recommends the tendinous portions of dogs' tails for making suture and ligature threads; they are more easily prepared, and are entirely resorbable, while more resistant than cat-

gut. The tendons, after being well cleaned, are plunged for forty-eight hours into a 2-per-cent. solution of corrosive sublimate, or into 5-per-cent. carbolic acid; they are then preserved in a 1-per-cent. solution of corrosive sublimate, 2-per-cent. carbolic acid, or 5-per-cent. boracic acid. The very smooth surface of these tendons renders disinfection easier.

Spragg¹⁵⁴ describes the method followed for insuring asepsis at the Military Hospital at Antwerp. It closely resembles the rules usually adopted.

SURGICAL DRESSINGS.

Hobby¹⁰⁸ states that fatty substances have been objected to as being sometimes irritating, as being the vehicles of infectious germs, as preventing union by first intention, and as being incompatible with the idea of asepsis. In answer to these objections the author says that all the derivatives of paraffin or vaselin are not irritating. He endeavors to prove by experiments that vaselin is a mechanically aseptic dressing. Fatty substances, once sterilized, are favorable media for the development of bacteria, but prevent the access of micro-organisms to aseptic wounds and limit the development of the bacteria in wounds already infected. Hobby claims that aseptic fatty substances form the best dressing for deep wounds. The wound once aseptic, the surfaces should be drawn as closely together as possible; haemostasis being properly performed, the wound should be covered with vaselin, and if cavities exist they should be filled with vaselin. Gauze sterilized by heat should be used as a covering, and a good absorbent layer of cotton or wadding placed over all.

Van Arsdale¹,²⁰ states that we are accustomed to treat granulating wounds like wounds capable of union by first intention. Very often these wounds are more or less inflamed, and, when covered with iodoform gauze, bleed at each dressing. For suppurating wounds a moist dressing is often chosen, keeping the wound damp and warm and augmenting the secretions. Eczematous eruptions and acute oedema often occur. This moist and damp condition is favorable to the development of germs; the dressings become putrid and must frequently be renewed. The antiseptics used irritate the wounds and cause them to seem inflamed. Since the work published by Halstead, a layer of gutta-percha is much

used for covering wounds, which, however, seems to render them indolent, inflamed and painful, and to prevent free drainage. Van Arsdale has experimented with fatty substances, and finds that carbolized oil is not antiseptic and is irritating. Pure olive-oil containing balsam of Peru gave very good results, but became rancid and, being very fluid, spread extensively. Castor-oil met the requirements, being soluble in alcohol; it dissolves 50 per cent. and more of the balsam of Peru, is sufficiently thick not to spread, and does not prevent the flow of the secretions. Being mixed with the Peruvian balsam, which seems to be sterile, it does not become rancid. The author uses from 4- to 5-per-cent. solutions, sometimes even 10-per-cent. Gauze saturated with the solution is used to cover the wound. Pyoktanin gauze, or sterilized gauze, may also be used. Iodoform, 2 or 3 per cent., may be added to the mixture. Cicatrization is rapid.

SUTURES AND INSTRUMENTS.

Sutures.—Longyear²²⁷ presents a new suture. The ligature is first passed at a certain depth, and passed again superficially in the opposite direction, the two ends being fastened on the side where the suture was begun. In this way a deep stitch and a superficial suture are made with the same thread. For ligature of pedicles in intra-abdominal operations a first ligature is placed near the extremity of the pedicle and another one centimetre lower.

Needles.—Kocher³³⁶, recommends a hollow needle, furnished at its extremity with a flat portion serving as a handle. Florence silk is slipped through it.

The Gilliam needle¹ is mounted upon a handle, and provided with an automatic-spring eye, easily threaded. The needle of Lucas-Championnière²¹² has a movable eye and blunt extremity, and is very useful for ligaturing pedicles, etc. That of Auguste Reverdin,²¹² with right and left needles, is capable of being adjusted either at an angle or vertically. In Lamblin's needle²¹² the eye may be closed by a small attachment movable on an axis, and disposed in such a manner that when the needle is being forced through the tissues it remains open, and when withdrawn the attachment, raised by the tissue, closes the eye. Hamilton's cannellated needle with a handle¹ is a modification of Crofford's needle.

Needle-holders.—Hagedorn⁷⁴⁸ has modified his well-known needle-holder for flat needles. Edgar Kurz³³⁶ has also brought out a modification of this needle-holder. He uses square needles with triangular points, in which the eye is just a little above the point. These needles are cannellated on their convex surface to receive the thread; the needle-holder is composed of a hollow stem, in which the extremity of the needle is placed; a spring, manipulated by a sort of trigger, forces the needle through the tissues and readily admits of the application of deep sutures. The Blondel needle-holder¹⁹⁴ consists of a simple forceps with flat jaws, provided with a copper plate, the branches of which are separated by means of a spring.

Knives and Forceps.—Jordan Lloyd² has devised a scalpel the extremity of which is provided either with a curette or with a periosteum-knife. The Phelps knife,¹² for cutting plaster apparatus, is a very strong knife with a lever at the end of the handle. The forked forceps, with saw-teeth, of Lucas-Championnière,²¹² permits of approaching and holding together the edges of a wound. Cordier⁵⁹ has constructed a forceps which he calls a "knot-tightener," and which is of the greatest service in all cases in which rapid suturing is desirable.

Tables.—Braatz's operating-table³³⁶ should also be mentioned. It is made of iron, and is to be recommended for its simplicity and its easy disinfection. An aseptic table of wood and glass, for the application of dressings, with a handle for holding an irrigator, is devised by Kreider.¹ (It would be preferable to replace the wooden portion by iron.)

Disinfecting Apparatus.—Frank Thornbury¹ has constructed an oven permitting of the boiling of instruments, and, at the same time, the sterilization (by steam) of objects necessary for dressings. Gendron⁷⁰ has also devised an apparatus for the sterilization of water and objects used for dressings. It consists of a steam-generator capable of supporting a pressure of six atmospheres, the temperature of which may be raised to 150° C. (302° F.); a distilling apparatus, provided with a refrigerator, and an autoclave for the sterilization of dressings. Sulzer²¹⁴ has had constructed a disinfecting apparatus in which objects of various kinds can be subjected to heat and steam.

Dressings.—Among the new dressings are the plastered wad-

ding of Breiger²¹⁴ and Hübscher's cellulose²¹⁴ for making fracture appliances, which are cheap and easily made. MacNeven¹⁰¹ has devised a simple apparatus admitting of the personal preparation of plaster bands. Bremner⁵⁹ warmly advocates the use of woven circular bandages of fine, soft, and flexible cotton in the treatment of varicose ulcers, fractures, articular hæmorrhages,—in a word, in all cases in which elastic pressure or regular compression may be indicated.

ANÆSTHETICS.

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CHLOROFORM.

Condition of the Blood in Chloroform Anæsthesia.—Oliver and Garrett ⁶, give an analysis of the blood during the inhalation of various anæsthetics. Rabbits were employed in the experiments, being completely anæsthetized before analysis of the arterial blood was made. The authors give full tables of their analysis, and point out that under chloroform the number of volumes is not large; that, except in the case of a dog submitted by them to experimentation, the amount of carbonic dioxide is not excessive, whereas a large amount of nitrogen appears. Chloroform is known to exert a powerful effect upon the blood-corpuscles; it also destroys the power hæmoglobin normally possesses of absorbing oxygen. The observers agree with Paul Bert and de St. Martin, that the deeper the narcosis the less is the oxygen and the greater the increase in carbonic-acid gas. Under ether there was a larger amount of oxygen and a smaller amount of nitrogen than under chloroform. With a mixture of chloroform and Brin's oxygen, the animal rapidly passed into a state of apnœa, and a longer time was required to establish anæsthesia. Under these conditions, also, the arterial blood was found to contain a larger quantity of carbonic acid than when chloroform alone was employed. When ether was mixed with oxygen, the blood-pressure rose; the respiration and circulation became very vigorous,—so much so that it seemed impossible to cause their arrest; even after opening the thorax the heart beat with great force. If pure chloroform were applied to the nostril at the stage of complete anæsthesia, the respiration gradually but quickly ceased. The authors regard the excess of carbonic acid present in the blood when oxygen was mixed with the anæsthetic as rather a measure of the increased activity of the tissues, due to the excess of oxygen, than as due to any real failure in elimination

of the carbonic acid. Under nitrous oxide there was a marked deficiency of oxygen and no excess of carbonic acid. Death under it seemed due to simultaneous cessation of circulation and respiration; the heart-cavities were all distended, the lungs collapsed, the veins engorged, and the arteries empty. Removal of a small quantity of blood from the heart caused a fairly vigorous beat to return. Both nitrous oxide and nitrogen were present in the blood analyzed.

Employment of Minute Doses.—Baudoin²⁴ believes the safest method of employing chloroform is the following: The patient lying upon his back, his chest is bared, a compress placed over his mouth, and 2, 3, or 4 drops of chloroform poured upon it. During the first few breaths, and during these only, the compress is applied so as not to close completely the nostrils and mouth. The face should be unceasingly watched for signs of impending syncope. In fifteen seconds the chloroform will have evaporated, when 4 or 5 drops more are then allowed to fall on the centre of the compress, this being turned rapidly so as to avoid any intake of fresh air. This manœuvre is repeated about every half-minute. Baudoin lays great stress upon the importance of not commencing any operative proceedings before complete anaesthesia is secured. It requires some 7 or 8 grammes ($1\frac{3}{4}$ to 2 fluidrachms) of chloroform to obtain anaesthesia. In order to maintain narcosis the compress is firmly applied to the nose and mouth, all air excluded, the two hands being superimposed to effect this result. Two or 3 drops only of the anaesthetic are used every minute, the compress being turned as before. Return to consciousness is very rapid.

Robert Bell, of Glasgow,²⁵ believes that symptoms of approaching danger under chloroform are always due to an overdose, and always appear in the following order: (a) coughing, (b) gasping, (c) choking, (d) struggling. If, he contends, at the first appearance of coughing the vapor is given more diluted, no further difficulty will arise.

The condition of the heart and circulation at the time of an operation, Foxwell thinks,²⁶ should be carefully studied. Functional high tension is of great importance; it is often due to fright, and threatens grave danger. Even in cases of chronic high tension not of much importance, as the heart soon accommodates itself, there is danger of a temporary further heightening due to

fear. The first sound is most worthy of study in this connection. If its duration is shortened, or if it is sudden, it betokens an incomplete, hurried, irregular muscular contraction of the heart, and signals danger. Further inquiry should be made as to whether palpitation has occurred recently, dyspnœa exists, etc. Accurate delineation of the size of the heart is also important as deciding the pressure of hypertrophy or dilatation. The administrator should satisfy himself (1) whether the heart is orderly and calm, or whether there is any tendency to disorder in its nervous mechanisms; (2) how much more force could the heart at the time of chloroformization put forth than that actually being employed. Foxwell believes that where the answer to the first question is unsatisfactory, alcohol taken five minutes before is valuable; or opium, given two or three hours before, is even better.

C. S. Morley, of Detroit, Mich., ¹,_{p.68, 72} places a handkerchief over his patient's face, pulling up a fold at the centre for an air-space for the chloroform-vapor, and drops 2 to 5 drops per minute. He insists upon having the chest bared, and watching the respiration, which should be rhythmic.

Kappeler's views ⁸⁰¹,_{v.22, p.24, July}, ⁶⁶ on chloroform are well worthy of comment. He thinks the dose should be regulated by the age and constitution of the patient as well as by the duration of the operation. To maintain anæsthesia when once established requires but little additional chloroform. He has invented an apparatus to carry out these principles, which is said to be efficacious and simple, as no valves are required.

Prince ⁸⁰,_{Jan.} cites cases in which all the usual resuscitative measures having failed, complete inversion and suspension by the bent knees over the operator's shoulders resulted in recovery.

Dealing with methods whereby the administration of chloroform can be rendered less dangerous, Bard ⁴⁴,_{July} comments upon the importance of posture. He places his patient flat upon the operating-table, and, after the first stage of anæsthesia is passed,—that is, after the stage during which mucus is secreted,—he removes the pillow from under the patient's head, and drags him up until the head hangs over the padded end of the table, so that the occipital protuberance touches the ledge of the table. The advantages of the method urged are: It lessens "friction" of the inspired and expired air; it raises the epiglottis; it occludes the æsophagus; it

opens the glottis ; it diminishes the liability to syncope ; it prevents stertor ; it increases the capacity of the thorax. Howard showed, in 1888, that the most effectual way of opening the air-passages was by forced extension of the head upon the trunk, thereby raising the epiglottis and tongue. Forceable dragging forward of the mandible is an adjuvant to this end. Again, Bowles has shown the importance of keeping the mouth shut ; for, "when the mouth is closed, the horizontal portion or body of the jaw forms nearly a right angle with the spinal column, from which the symphysis is then at its greatest distance. When the mouth is opened by the dropping of the jaw, the symphysis describes the arc of a circle, and approaches more nearly to the spine where the posterior wall of the pharynx is attached. The tongue having its chief attachment to the symphysis, would consequently be drawn away from the pharynx in the former case, and allowed to rest in contact with it in the latter." He further shows that when the patient lies upon his back, on the mouth being opened, the tongue falls back upon the wall of the pharynx and occludes the rima glottidis. On closing the mouth this is remedied. Even with a closed mouth the tongue will almost touch the pharynx if the chin drops upon the sternum. The compression to obliteration of the œsophagus, which this method entails, lessens the liability to vomiting, it is asserted ; while, if vomiting should take place, it directs the flow rather toward the nares than the larynx. The gravitation of the blood to the brain, entailed in this forcible extension, is said to decrease the liability to syncope. The tightening of the mucous-membrane folds over the arytenoid cartilages prevents all laryngeal stertor, and, of course, the dangerous interference with respiration which it proclaims. The contentions of the Hyderabad Commission have received their due share of attention during the year, but it cannot be said that any very practical results have occurred from the criticism and cross-criticism.

Hehir⁹⁰ once more tells us the story of the Commission and reiterates its findings : that the first symptoms of anything going wrong in chloroform administration is always shown by interference with the rhythm of respiration ; that attention to this always removes danger ; that any effects upon the heart, such as slowing or stoppage and fall of blood-pressure, are really protective in that they lessen the amount of chloroform which is pumped into the

nerve-centres. He sums up as the whole duty of the chloroformist as follows : "Use pure chloroform ; watch the respiration, and keep it regular." A more important communication is that of Gaskell and Shore,² criticising the Hyderabad Commission under the fresh light thrown upon the matter by their cross-circulation experiments. These writers say, "To our minds it is perfectly clear that the weakening effect of chloroform on the heart is the chief, if not the only, cause of the fall of blood-pressure seen upon administration of the drug ; it is difficult to understand how the Hyderabad Commission could have arrived at their conclusions, as a large number of the curves point directly to heart-failure as the cause of the fall of blood-pressure." They further point out that death under chloroform may occur as a result of weakening of respiration, causing insufficient aëration of the blood, which again causes heart-failure through chloroform *plus* asphyxia ; or by weakening of the heart, causing insufficient blood-supply to the respiratory centre, which, in its turn, causes cessation of the respiration through the combined action of chloroform and insufficient blood-supply. Further, it is contended that, the less well supplied the medullary centre with oxygenated blood, the less is it able to resist the action of the chloroform. Hence, they dissent from the view advanced by Surgeon-Colonel Lawrie, that the fall of blood-pressure is in itself a safeguard. Dissenting from the physiology of the Hyderabad Commission, Gaskell and Shore agree with its plea for giving chloroform well diluted and weakening well the respiration. As they point out, these views were enunciated as long ago as the days of Snow, and have ever since been recognized. As a supplement to the labors of this Commission, the *London Lancet* has issued a very elaborate clinical report.⁶ v.1, pp. 229, 230, 761, 762, 971, 1111, 1170 They appointed Dudley Buxton as their commissioner, and under his supervision the records of all deaths and cases of danger reported since 1848 have been classified and arranged.

Guthrie,² draws attention to what he regards as a fresh danger of chloroform. A number of children upon whom operations of more or less severity had been performed died within a few days after inhaling chloroform, as a result, he thinks, of a species of slow poisoning by that drug, which had engendered a kind of fatty degeneration. Similar conditions in dogs have been noticed by Ungar and Strassmann, Thiem and Fischer,⁴¹ and by Ostertag.²⁰

ETHER.

Ether seems to have increased in favor in many quarters during the past few years, and, although fewer polemic papers have been written about this anæsthetic during the year 1893, yet several surgeons have given their results; notably Kaefer,²¹ Gordon Campbell,²⁸² Vallas,⁹¹ Roger Williams.⁹⁰ Campbell gives the results arrived at in using Clover's smaller, portable, regulating ether-inhaler, fully described by Buxton.^{2130 2131} The principle of Clover's inhaler is that a small percentage of ether, probably 5 per cent. or less, is inhaled at first and the strength gradually increased as the patient's air-passages grow inured to its irritating effects. Campbell anæsthetized his patients on an average in 5.2 minutes. After complete anæsthesia is produced, only a very dilute vapor is required to maintain unconsciousness. By reassuring the patient, and, when need be, removing the face-piece, no struggling need occur. It was also found that only 60 per cent. of ether was really required to produce absolute anæsthesia. The quantity of ether used was 4 ounces 6 drachms (23 grammes) in one hour and a half,—the average length of the operations. The quantity used at each successive period was less and less. Vomiting did not occur in one-third of the cases. Rapidity of respiration, Campbell asserts, is a sign that more ether is being given than is necessary, whereas slow respirations indicate that the patient is passing out of its influence. [This observation, however, is not absolutely correct, for patients who are only very lightly under the influence of ether will, as soon as skin-areas are excited by cutting or other peripheral nerve-stimulation, begin to breathe with very great rapidity.] Should the tongue fall back, pushing forward the mandible by the fingers placed at the angles will open the rima. Thick mucus, if it collect and interfere with respiration, is easily removed with a sponge attached to a sponge-holder. Campbell rightly insists upon the necessity of a quiet room for anæsthetizing. With regard to the criticism advanced against this inhaler, that its efficacy depends largely upon its acting by semi-asphyxiating the patient, he points out that when the inhaler is lifted every second inspiration or so, all asphyxial effects being thus avoided, satisfactory anæsthesia is rapidly obtainable, with but little discomfort to the patient. Other advantages are: the small amount of ether used and the slight escape of ether into the room; the extremely

slight liability to vomiting. It should be added that all the patients were carefully prepared for the anæsthetic, and that, although very careful observations were made for some ten days or so after the operation, no after-effects, such as bronchitis, nephritis, etc., occurred.

Vallas,⁹¹ in the course of his thoughtful paper, calls attention to the fact that the surgeons of Lyons have used ether and chloroform concurrently, and apparently arrived at the conclusions to which he adverts without any preconceived or biased opinions. Glancing at the history of the introduction of ether and chloroform at Lyons, Vallas points out that the undoubted merits of chloroform rapidly raised it into a first place, from which, however, it was rapidly ousted by the occurrence of five or six deaths within a very brief period of its introduction. [Barrier.²¹⁸¹] A commission instituted in 1867 could only find evidence of six deaths under ether in twenty years out of a very large number of major operations, confirming the favorable opinion then held. At Lyons an inhaler is always employed and pure ether used. The Roux mask is adopted as being simple and easily cleansed and disinfected,—very important points about an inhaler. [The present form of Clover's ether-inhalers, as modified by me, is so arranged as to be capable of complete cleansing and disinfection.] With this apparatus 100 to 200 grammes ($3\frac{1}{4}$ to $6\frac{1}{2}$ ounces) usually suffice for an operation. Struggling, Vallas points out, as did Campbell, need not occur, and is usually due to the impatience of the anæsthetist, who attempts to push the ether too rapidly, and in so doing partly asphyxiates the patient. Vomiting, in the experience at Lyons, is not infrequent, and is lessened if morphine is injected previous to the use of ether. However, sickness is rare if the stomach is not loaded with a meal, and is as liable to occur with chloroform as with ether. Vallas states that the usual modes of death from chloroform are: (1) primary syncope due to laryngeal reflex, in which the symptoms appear at the very outset; (2) secondary or bulbar syncope, the symptoms of which occur more slowly; and (3) tertiary syncope from direct poisoning of the spinal centres. [Dastre.] Primary syncope from laryngeal reflex Vallas has never met with in Lyons, after daily use of ether for fifteen years. Bulbar syncope under ether, if it occur at all, is very rare. Whatever dangers ether possesses arise from the respi-

ratory tract, and these are averted when noticed in time and artificial respiration practiced.

Dealing with statistics and clinical observations, he cites 14,581 etherizations and 3 deaths, or 1 in 4860; 12,368 chloroformizations and 10 deaths, or 1 in 1236. Julliard's figures are also striking: ether, 314,738 and 21 deaths, or 1 in 14,987; chloroform, 524,507 and 161 deaths, or 1 in 3258. Gurlt's results²²⁶ _{v.ii,p.180} are: ether, 8433 and 1 death, or 1 in 8433; chloroform, 95,249, with 37 deaths, or 1 in 2574. Ollier records 40,000 ether cases without a death; Léon Tripier, 6500 ether cases without a death, and Poncet in 15,000 etherizations had two deaths, the particulars of which are given. In the one case a tubercular infant in a depraved state of health died from asphyxia. The necropsy showed advanced aortic disease and disseminated tuberculosis. In the second case an anæmic woman was, after the operation, placed in the sitting posture while being carried to her bed. She became blanched, and evidently suffered from syncope. Although apparently rallying under restorative measures, she died in the night from symptoms of progressive nervous exhaustion. Overvigorous attempts at artificial respiration seem to have done this patient grievous bodily harm. With the exception of acute pulmonary troubles, there are, Vallas thinks, few, if any, contraindications to ether when properly given. Accidents are less liable to occur and more readily dealt with than in the case of chloroform. He concludes that ether is as efficacious as chloroform, that it gives as complete and as prolonged an anæsthesia, and that the methods by which it can be given are as simple. The death-rate under ether is far less than under chloroform, for such accidents as do occur are of less sudden onset, are less dangerous in their nature, and more easily and successfully dealt with.

R. Williams⁹⁰ _{p.180} has analyzed the records of St. Bartholomew's Hospital, and finds that in sixteen years chloroform was given 19,526 times with 13 deaths, or 1 in 1502; ether was given 21,332 times with 4 deaths, or 1 in 5333; and ether, preceded by nitrous-oxide gas, 12,941 times with one fatality. He concludes that ether is safer than chloroform, and that ether preceded by "gas" is safest of all. After detailing the casualties, he adds: "It is impossible for clinicians to abandon the evidence of their senses in this matter at the dictum of the Hyderabad Commission." The

post-mortem appearances showed extensive disease of the heart in 5 cases; in 3, deaths from "cardiac" syncope was reported, and the autopsy revealed extensive pulmonary disease, in 1 case coupled with *morbus cordis*. In 6 cases death took place before the operation, in 2 during, and in 2 immediately afterward. Of the deaths under ether, 2 occurred in persons exhausted by constant vomiting, due to intestinal obstruction, 1 from apparent cardiac syncope, the patient being a confirmed drunkard and in delirium tremens at the time of operation. The death under "gas and ether" was that of a very anaemic, weakly woman.

Murray Aynsley⁵⁵⁷ concludes, as a result of a careful analysis of cases, that deaths are most frequent under chloroform when small-dose methods are employed among highly-cultivated, emotional races; colored races reveal less shock and are less subject to fatality; the "partial anaesthesia *plus* shock theory" explains many deaths.

COCAINE.

Von Oepele¹⁰⁸⁴,_{p.22,23} employs phenate of cocaine as being more persistent in its effects and less toxic than other cocaine salts, the phenate being less soluble in the water of the tissues. A 4- or 6-per-cent. solution is best, although weaker solutions are used. It is both analgesic and antiseptic.

Reclus⁸,_{p.27} advocates cocaine in minor surgery in 2-per-cent. solution. When the operation is likely to be a prolonged one and so requiring repeated injections, he used a 1-per-cent. solution. Each syringe carries 0.2 or 0.1 gramme (3 or 1½ grains) of cocaine, respectively; 0.20 gramme (3 grains) is the limit, and this should never be exceeded, even in major operations, all manner of which Reclus has undertaken with cocaine. He places the patient in the horizontal posture, and injects the cocaine slowly into the cellular tissue, waiting three to four minutes or five to six, according as the stronger or weaker solution is employed. The analgesia only extending within half an inch of the track of the needle, the knife must be used only within this area, and all dragging or pulling avoided.

Hobbs¹¹,_{p.27} states that systemic effects are produced more rapidly when a large mucous surface is involved, even when the solution is a very weak one, toxic symptoms following the use of even

1 per cent. There seems no general rule or indication as to what persons are likely to stand cocaine well; "every individual is a law to himself," and the effects produced may in "the same individual vary at different times"; in some instances the physiological effect of the drug has to be reached before analgesia is attained. Hobbs used brandy or whisky at the first onset of toxic symptoms. Schleich,²⁰⁰³ _{v.n.p.m.} is stated to employ three solutions to obtain local anaesthesia. One contains 1 part cocaine in 1000 parts of 0.2-per-cent. solution of sodium chloride in water,—i.e., 200 minims (13.3 grammes) of the solution contain 5 grains (0.013 gramme) of cocaine. The second solution, which Schleich employs when more severe operative measures are to be employed, consists of 1 part of cocaine in 5000 of the 0.2-per-cent. salt solution. The third solution consists of 1 part of cocaine in 10,000 of the 0.2-per-cent. solution. For the employment of the more dilute solutions a syringe of 1 to 2 ounces (30 to 60 grammes) in capacity is called into requisition. The skin over the part to be operated upon is frozen with an ether spray, and the syringe-needle is then inserted. Subsequently other copious injections are made until the whole area is made artificially oedematous with copious injections. To render bone operations painless, Schleich injects his solutions beneath the periosteum. The water employed in the salt solutions should be sterilized. It is said that no toxic effects have so far been met with during the use of this infiltration anaesthesia.

D. Braden Kyle⁸⁰ has employed phenate of cocaine (Merck) with quite satisfactory results. The dose he uses is $\frac{1}{2}$ to $\frac{1}{6}$ grain (0.005 to 0.01 gramme) every four hours, or for local application a solution of from 1 to 10 per cent. The salt has the same physiological properties as cocaine, while it possesses also antiseptic powers. It takes about seven minutes to produce anaesthesia. Veasey,⁹ _{App.1} who has also used phenate of cocaine in ophthalmic, nasal, oral, anal, and urethral surgery, speaks well of it. As it coagulates albumen, it localizes its own action, preventing any extensive absorption of cocaine. Instilled into the conjunctiva, a 4-per-cent. solution causes photophobia, smarting, lachrymation, and in four minutes anaesthesia with slight dilatation of the pupil. As the substance is soluble in alcohol and albolene, it may be used in either form. Veasey was able to treat successfully several cases of irritable throat with the phenate of cocaine after cocaine had

been obliged to be discontinued on account of the constitutional symptoms that drug had occasioned. Poinsot ⁸⁷ also speaks highly of this anæsthetic in the surgery of the larynx.

It is asserted by Gauthier that the addition of nitroglycerin to cocaine abrogates any likelihood of the supervention of deleterious results.

TROPACOCAIN.

Tropacocaine or benzoyl-pseudo-tropeine is an alkaloid obtained from the coca-tree of Java. Hugenschmidt ⁸⁸ has used it with satisfaction as a local anæsthetic, and regards it as less toxic than cocaine. He employs the following solution: Tropacocaine, 0.10 gramme ($1\frac{1}{4}$ grains); aq. destill., 2.5 grammes ($38\frac{1}{4}$ grains); and injects 0.025 gramme ($\frac{1}{8}$ grain). Very slow (one-minute) injections are necessary. Tropacocaine, being antiseptic, keeps far longer than cocaine solution, and so need not be fresh-prepared every day.

Pinet and Vian ^{2188; 781} have investigated tropacocaine, especially with reference to its employment in dental surgery, and came to the following conclusions: The hydrochlorate unquestionably is, locally, anæsthetic; the dose required varies according as the tissues are superficial or deep, and also as the operation is brief or prolonged. For dental cases an average dose is 0.3 gramme ($4\frac{1}{2}$ grains) dissolved in distilled water, but 0.4 gramme (6 grains) will probably be requisite for a difficult extraction. Toxic doses bear a definite relation to the size and weight of the animal experimented upon. As to the anæsthesia produced, it is, at least, as great as cocaine, while untoward results are less liable to follow. They coincide with the views of Reclus, that the action of the drug is more violent and more rapid the more concentrated the solution, and urge that for practical purposes the solutions be highly diluted.

MISCELLANEOUS.

Although several papers have appeared upon the use of pental, bromethyl, and other less-used anæsthetics, they have not brought out any striking points, nor tended to bring these substances into greater use. The enhanced interest taken in the subject of anæsthetics is shown by the successful organization in

London of a society of anæsthetists. We hope, in succeeding issues, to deal with the transactions of this society, as they discuss very important questions with greater freedom than elsewhere.

P. Wagner,²² gives the statistics of deaths under anæsthetics, as follow: Pental, 1 death in 199 cases; chloroform, 1 in 2900; chloroform *plus* ether, 1 in 4100; bromide of ethyl, 1 in 4550; ether, 1 in 14,500.

INDEX TO VOLUME THIRD.

By N. I. DEVEREUX,

PARIS.

Abdomen, surgery of.....	C- 1	Appendicitis.....	C- 42	Caecum, surgical diseases.....	C- 21
abscess.....	C- 48	diagnosis.....	C- 42	abscess.....	C- 41
appendix vermiciformis.....	C- 42	treatment, surgical.....	C- 42	adeno-carcinoma.....	C- 40
anastomosis.....	C- 54	Arm and hand, aneurism.....	K- 15	sarcoma.....	C- 41
drainage.....	C- 50	Arteries, diseases.....	K- 1	tuberculosis.....	C- 21
foreign bodies.....	C- 19	aneurism (q.v.).....	K- 6	Calculi, biliary (see Gall-bladder)....	C- 9
gall-bladder and ducts (q.v.).....	C- 8	injuries.....	K- 1	prostatic.....	F- 41
ilio-cecal region (q.v.).....	C- 40	ligature methods.....	K- 2	salivary.....	L- 10
injuries.....	C- 46	Arteries and veins, injuries and dis-		vesical.....	F- 30
instruments.....	C- 54	cases.....	K- 1	urethral.....	F- 18
intestines (q.v.).....	C- 20	Arthritis	I- 26	Cancer.....	M- 12
liver (q.v.).....	C- 1	purulent.....	I- 27	contagion.....	M- 12
mesentery (q.v.).....	C- 39	Arthropathies, syringomyelic.....	I- 27	etiology.....	M- 12
omentum.....	C- 36	Ascites, laparotomy in.....	C- 34	treatment.....	M- 15
operations.....	C- 49	Auricle, angioma.....	L- 24	Carotid, aneurisms.....	K- 5, 11
pancreas (q.v.).....	C- 59	Axillary artery, aneurism	K- 15	Cervical aneurism.....	K- 8
penetrating wounds.....	C- 48	Axillary vein, wound.....	K- 17	Chancere.....	G- 22
peritoneum (q.v.).....	C- 30	Bile-ducts, surgery.....	C- 12	Chancroid.....	G- 51
spleen (q.v.).....	C- 56	Biliary calculi (see Gall-bladder)....	C- 9	treatment.....	G- 52
stomach (q.v.).....	C- 15	Bladder, male, surgical diseases.....	F- 28	Cheek, adenitis of.....	L- 23
technique.....	C- 50	autoplasty experiments.....	F- 38	Chest, wounds (see Lungs, surgery)....	B- 1
Abdominal aneurism.....	K- 9	cystitis.....	F- 38	Chloroform, as an anesthetic.....	Q- 1
Abcess.....	M- 3	cystophotography.....	F- 32	Cholecystectomy.....	C- 12
cerebral, surgical treatment.....	A- 23	cystoscopy.....	F- 32	Cholecystenterostomy.....	C- 14
mediastinal.....	B- 25	diagnosis.....	F- 37	Cholelithiasis (see Gall-bladder)....	C- 9
of liver.....	C- 1	erysipelas.....	F- 3	Cirsoid aneurism.....	K- 7
subdiaphragmatic.....	B- 22	fistula.....	F- 38	Clavicle, excision.....	I- 3
subphrenic.....	B- 24	hernia.....	F- 38	fracture.....	J- 4
Achillodynia.....	I- 20	lactic-acid fermentation.....	F- 33	Clavus syphiliticus.....	G- 32
Actinomycosis.....	M- 7	paralysis.....	F- 30	Cleft palate.....	L- 20
Alopecia, syphilitic.....	G- 30	pericystitis.....	F- 28	Club-foot.....	H- 34
Amputations.....	I- 1	rupture.....	F- 37	Club-hand.....	H- 16
hip.....	I- 1	stone.....	F- 30	Cocaine as an anesthetic.....	Q- 9
knee.....	I- 2	supra-pubic cystotomy.....	F- 33	Colon, surgical diseases.....	C- 21
upper extremity.....	I- 2	sympyseotomy	F- 35	carcinoma.....	C- 21
Amputations, excisions, and plastic		tumors	F- 29, 36	Colotomy.....	E- 12
surgery; diseases of bones		Blood, in syphilis.....	G- 39	Cooper's gland, suppuration.....	F- 18
and joints.....	I- 1	Bone-grafting.....	I- 30	Coxitis, treatment.....	I- 13
Anesthetics.....	Q- 1	Bones, diseases.....	I- 6	Cranieotomy, bilinear.....	A- 5
chloroform.....	Q- 1	achillodynia.....	I- 20	Cystitis.....	F- 3, 38
condition of blood.....	Q- 1	bone-growth	I- 19	Cystophotography	F- 32
cocaine.....	Q- 9	exostoses.....	I- 23	Cystoscopy	F- 32
deaths under.....	Q- 12	lead poisoning.....	I- 20	Cystotomy, supra-pubic.....	F- 33
ether.....	Q- 6	metatarsalgia.....	I- 20	Cysts.....	M- 10
tropacocaine.....	Q- 11	myositis ossificans.....	I- 24	Dislocations.....	J- 4
Aneurisms, arterial.....	K- 6	necrosis.....	I- 19	astragalus.....	J- 5
abdominal.....	K- 9	osteo-arthropathy.....	I- 19	elbow.....	J- 4, 6
brachial.....	K- 12	osteomalacia.....	I- 17	hip.....	J- 4
carotid, common.....	K- 11	osteomyelitis.....	I- 18	congenital.....	H- 25
external	K- 5	pseudarthrosis.....	I- 21	knee	J- 5
cervical.....	K- 8	sacro-iliac disease.....	I- 16	patella.....	J- 5
cirsoid.....	K- 7	syphilis.....	G- 14; I- 19	shoulder.....	J- 4
diagnosis	K- 6	tuberculosis.....	I- 6	Dorsalis pedis, aneurism.....	K- 15
dorsalis pedis.....	K- 15	tumors	I- 23	Drainage.....	P- 18
external iliac.....	K- 2, 13	Brachial artery, aneurism.....	K- 12	Elbow, dislocation.....	J- 4, 6
femoral.....	K- 13	Brain, surgery of.....	A- 1	Empyema, surgical treatment.....	B- 16
gluteal.....	K- 13	abscess.....	A- 23	Encephalopathy, syphilitic.....	G- 38
innominate artery.....	K- 10	epilepsy.....	A- 52	Enchondroma.....	M- 21
iliac.....	K- 2	fractures of vault of skull.....	A- 36	Epididymitis.....	F- 15
multiple.....	K- 6	general paralysis of insane.....	A- 59	Epilepsy, surgical treatment.....	A- 52
popliteal.....	K- 7, 13	haemorrhage.....	A- 33	Epispadias	F- 10
radial.....	K- 12	hernia.....	A- 60	Equino-varus.....	H- 34
subclavian.....	K- 11	hydrocephalus.....	A- 18	Erythema, syphilitic.....	G- 31
thoracic.....	K- 9	microcephalus.....	A- 19	Ether as an anesthetic.....	Q- 6
vertebral.....	K- 12	new operations.....	A- 5, 59	Excisions.....	I- 3
Aneurisms, arterio-venous.....	K- 15	syphilis.....	G- 38	Exostoses.....	I- 23
axillary artery.....	K- 15	temporary resection.....	A- 5	Face, surgery of.....	L- 13
arm and hand.....	K- 15	topography.....	A- 1	rhinoplasty	L- 13
femoral	K- 15	tumors and cysts.....	A- 8	of lip.....	L- 10
posterior tibial.....	K- 16	wounds.....	A- 50	Femoral artery, aneurism.....	K- 13, 15
Ankle, resection	I- 4	Brain, spinal cord, and nerves, sur-		injury	K- 1
Anthrax.....	M- 4	gery of.....	A- 1	Femoral vein, wound.....	K- 20
Antiseptics and surgical dressings....	P- 1	Breast, cancer.....	M- 15	Femur, fracture.....	J- 3
Anuria, surgical treatment.....	F- 45	Bronchocele.....	B- 9		
Anus, fistula.....	E- 13	Bubo, treatment.....	G- 52		
stricture.....	E- 12				

Finger, mallet.....	H- 14	Ileo-caecal region, surgery.....	C- 40	Mediastinum, tumors.....	B- 7
deviation of.....	H- 15	epithelioma.....	C- 27	Mesentery, surgery of.....	C- 39
Fistula, of chin.....	L- 9	Ileum, cancer.....	C- 40	cyst.....	C- 39
of ureter.....	F- 43	volvulus.....	C- 25	chylous.....	C- 40
of urethra.....	F- 25	Iliac artery, aneurism.....	K- 13	lipoma.....	C- 25
Foot, club.....	H- 34	perforation.....	K- 1	myxolipoma.....	C- 40
ingrowing toe-nail.....	H- 35	Ilium, excision.....	I- 6	Metatarsalgia	H- 36; I- 20
metatarsalgia.....	H- 36	Immunity.....	N- 17	Microcephalus, surgical treatment.....	A- 19
Fractures.....	J- 1	In-growing toe-nail.....	H- 35	Molluscum fibrosum.....	M- 22
compound.....	J- 1	Innominate artery, aneurism.....	K- 10	Morbus coxarius.....	H- 18
elbow.....	J- 4	Intestines, surgery of.....	C- 20	Mycoes, surgical.....	M- 1
femur.....	J- 3	anastomosis.....	C- 22	abcess.....	M- 3
hip.....	J- 5	appendix vermiciformis.....	C- 42	actinomycosis.....	M- 7
humerus.....	J- 4	caecum.....	C- 21	anthrax.....	M- 4
jaws.....	L- 1	colon.....	C- 21	cancer (q.v.)	M- 12
leg and thigh.....	J- 3	ileo-caecal region.....	C- 40	cysts.....	M- 10
patella.....	J- 5	tumors.....	C- 40	glanders.....	M- 8
radius.....	J- 2	Injuries.....	C- 46	tuberculosis and scrofulosis.....	M- 1
skull.....	A- 36	intussusception.....	C- 28	tumors.....	M- 21
spine.....	A- 60	mesentery.....	C- 39	Myelitis, traumatic	A- 65
Fractures and dislocations.....	J- 1	obstruction.....	C- 22	Myositis ossificans.....	I- 24
Gall-bladder, surgery of.....	C- 8	Intra-cranial haemorrhage, surgical			
bile-ducts	C- 12	treatment.....	A- 33	Nasal cavities, syphilis.....	G- 32
biliary calculi.....	C- 9	Ischio-pubic dislocation	H- 25	Nephrectomy.....	F- 46
cholecystectomy.....	C- 12	Jaws, surgical diseases.....	L- 1	Nephrolithiasis.....	F- 48
cholecystenterotomy.....	C- 14	dislocations	L- 3	Nerves, surgery of.....	A- 68
wounds.....	C- 9	fracture.....	L- 1	Gasserian ganglion.....	A- 68
Ganglion.....	I- 27	occlusion.....	I- 4	grafting	A- 72
Gangrene, senile, amputation.....	I- 2	operations.....	L- 7	neuralgia.....	A- 69
Gasserian ganglion, surgery of.....	A- 68	Joints, surgical diseases.....	I- 26	sciatic	A- 73
Genito-urinary apparatus in the		ankle-joint, resection.....	I- 4	suture	A- 72
male, surgical diseases.....	F- 1	arthritis, purulent	I- 27	Neurasthenia, urinary.....	F- 17
bacteriology.....	F- 2	arthropathy, syringomyelia.....	I- 27	Neurofibroma.....	M- 20
bladder (q.v.)	F- 28	flail-joints	I- 27	Neuroses, traumatic	O- 1
epididymis.....	F- 15	ganglion.....	I- 27	etiology and pathology	O- 4
general literature.....	F- 1	hip-joint disease.....	H- 18	medico-legal aspects	O- 6
kidney (q.v.)	F- 43	knee-joint, excision.....	I- 3	prognosis and treatment	O- 5
penis (q.v.)	F- 9	loose bodies.....	I- 26	semeiology and diagnosis	O- 1
prostate (q.v.)	F- 39	shoulder-joint, excision.....	I- 5	Nose, surgery of.....	L- 13
scrotum (q.v.)	F- 11	Jugular vein, ligature.....	K- 21	fracture.....	L- 13
seminal vesicles	F- 16	Kidney, surgical diseases.....	F- 43	rhinoplasty	L- 15
testicle and cord (q.v.)	F- 11	abscess.....	F- 47	Edema, neuropathic, nerve-stretch-	
ureters (q.v.)	F- 42	anuria.....	F- 45	ing in.....	A- 71
urethra (q.v.)	F- 18	cancer.....	F- 48	Omentum, surgery of.....	C- 36
Genn valgum	H- 31	floating.....	F- 46	cyst, hydatid	C- 36
Glanders	M- 8	hydatid cysts.....	F- 47	Oral and plastic surgery.....	L- 1
Glands, salivary, surgical diseases.....	L- 9	nephrolithiasis.....	F- 48	Orchidopexy.....	F- 14
Gluteal artery, aneurism.....	K- 13	operations.....	F- 45	Oriohiococcus.....	F- 4
Gonorrhœa	F- 4, 19	syphilis.....	G- 31	Orchitis.....	F- 11
Guins, hypertrophy	L- 23	traumatism	F- 47	Orthopaedic surgery.....	H- 1
Hæmorrhoids.....	E- 1	tuberculosis	F- 49	foot	H- 34
Hæmostatics.....	P- 14	Knee, amputation.....	I- 2	hand	H- 13
Hand, injuries, surgical treatment.....	I- 32	angular deformity	H- 29	hip	H- 18
arterial wound.....	K- 2	excision	I- 3	lateral curvature	H- 5
club-hand.....	H- 16	Knock-knee	H- 30	leg	H- 29
lateral deviation of phalanges	H- 15	Lateral curvature	H- 5	rickets	H- 37
mallet-finger	H- 14	Lead poisoning of bones	I- 20; N- 20	sacro-iliac disease	H- 8
to improve flexibility	H- 13	Leg, surgery	H- 29	spina bifida	H- 10
Harelip	L- 16	Leukokeratosis	L- 11	spondylitis	H- 1
Heart, surgical diseases, treatment	B- 9	Lips, surgical diseases	L- 10	torticollis	H- 11
mediastino-pericarditis	B- 11	fistula	L- 10	Osteo-arthropathy	I- 19
pericardial effusion	B- 9	harelip	L- 16	Osteomalacia	I- 17
wounds	B- 5	tuberculosis	L- 11	Osteomyelitis	I- 18
Hernia	D- 1	Liver, diseases, in syphilis	G- 41	Palate, surgery of	L- 16
cerebral	A- 60	surgery of	C- 1	Pancreas, surgery of	C- 59
crural	F- 38	abcess	C- 1	cyst	C- 60
diaphragmatic	D- 17	hepatic phlebotomy	C- 8	haemorrhage	C- 59
encysted	D- 24	hernia	C- 8	Paralysis, general, of insane, surgical	
gangrenous	D- 13	hydatid cysts	C- 5	cal treatment	A- 59
general operative procedures	D- 1	tumors	C- 7	Parotitis and orchitis	F- 15
inguinal	D- 18	Lumbrocoid worms, obstruction from	C- 28	Patella, fracture	J- 5
ischiatic	D- 24	Lungs, surgery of	B- 1	Penis, diseases	F- 9
of liver	C- 8	abscess	B- 22	deformities	F- 9
radical cure	D- 1	mediastinal	B- 25	fistula	F- 9
retroperitoneal	D- 22	subphrenic	B- 24	gangrene	F- 9
strangulated	D- 8	tubercular	B- 27	syphilis	G- 36
umbilical	D- 14	empyema	B- 16	tuberculosis	F- 10
ventral	D- 24	general considerations	B- 1	tumors	F- 9
vermiform appendix	D- 23	hydrothorax	B- 12	Pericarditis, surgical treatment	B- 9
Hicough, in hereditary syphilis	G- 15	new instruments	B- 32	Pericystitis	F- 28
Hip, congenital dislocation	H- 25	pleuritic effusion	B- 13	Peritoneum, surgery of	C- 30
Hip-joint disease	H- 18	pneumonectomy	B- 30	cysts	C- 36
amputation	I- 1	pneumothorax	B- 12	peritonitis	C- 32
Humerus, fracture	J- 4	pneumotomy	B- 28	ascites in	C- 34
Hydatid cysts	M- 10	tuberculosis	B- 13	from gonorrhœa	F- 18
of kidney	F- 47	tumors	B- 7	suppurative	C- 32
of liver	C- 5	hydatids	B- 7	traumatic	C- 35
of lung	B- 7	mediastinal	B- 7	tubercular	C- 32
Hydrocele	F- 14	wounds	B- 2	tumors	C- 39
Hydrocephalus, surgical treatment	A- 18, 67	penetrating lacerated	B- 3	Phlebitis	K- 22
Icterus, syphilis a cause of	G- 41	stab	B- 4	Plastic surgery	I- 28

Pneumothorax.....	B- 12	Spine, surgery of, lateral curvature.....	H- 5	Talipes valgus.....	H- 34
surgical treatment.....	B- 12	paraplegia.....	A- 63	Tarsectomy.....	I- 5
Pneumotomy.....	B- 28	Pott's disease.....	A-63; H- 1	Teeth, surgical diseases.....	L- 8
Polyarthritis deformans.....	I- 26	scoliosis.....	H- 7	abnormal development.....	L- 8
Popliteal artery, aneurism.....	K- 13	spina bifida.....	H- 10	fistulae of chin from.....	L- 9
Pott's disease.....	A-63; H- 2	syphilis.....	G- 39	Testicle and cord, diseases.....	F- 11
Prostate, diseases.....	F- 39	tumors and cysts.....	A- 67	ectopia.....	F- 15
cancer.....	F- 41	Spleen, hypertrophy, in syphilis.....	G- 41	epididymitis.....	F- 15
concretions.....	F- 41	surgery of.....	C- 56	haemorrhagic infarction.....	F- 13
hypertrophy.....	F- 39	cysts.....	C- 56	orchidopexy.....	F- 14
physiology.....	F- 39	hypertrophy and rupture.....	C- 57	syphilis.....	G- 16
prostatectomy.....	F- 39	splenectomy.....	C- 58	torsion.....	F- 13
prostatometer.....	F- 42	wounds.....	C- 57	Tetanus.....	N- 4
thrombosis.....	F- 39	Spondylitis.....	H- 1	Thoracic aneurism.....	K- 9
tuberculosis.....	F- 42	Stenson's duct, calculi.....	L- 10	surgery (see Lungs, surgery of).....	B- 1
Psendarthrosis.....	I- 21	Stomach, surgery of.....	C- 15	Tibial artery, aneurism.....	K- 16
Psoriasis in syphilis.....	G- 21	flatula.....	C- 18	Tic douloureux, surgical treatment.....	A- 70
Pustule, malignant (see Anthrax).....	M- 4	foreign bodies.....	C- 20	Tobacco, and syphilis.....	G- 40
Pyæmia.....	F-18; N- 16	gastralgia.....	C- 15	Tongue, surgery of.....	L- 11
from urethral infection.....	F- 18	pyloric obstruction.....	C- 16	angioma.....	L- 11
Pylorus, obstruction.....	C-16, 26	ulcer.....	C- 16	leucokeratosis.....	L- 11
Rabies.....	N- 1	wounds.....	C- 20	malignant disease.....	L- 11
Radial artery, aneurism.....	K- 12	Stricture of urethra.....	F- 23	syphilis.....	G- 29, 40
Radius, fracture.....	J- 2	Subclavian artery, aneurism.....	K- 11	Torticollis.....	H- 11
Ranula, treatment.....	L- 10	injury.....	K- 1	Traumatic neuroses.....	O- 1
Rectum, diseases.....	E- 1	Subclavian vein, wound.....	K- 17	Trigeminus, surgery of.....	A- 69
cancer.....	E- 9	Surgical diseases.....	N- 1	Tropacocaine as an anaesthetic.....	Q- 11
excision and colotomy.....	E- 9	hydrophobia.....	N- 1	Tuberculosis, genito-urinary.....	F- 2
haemorrhoids.....	E- 1	tetanus.....	N- 4	of bone.....	I- 6
miscellaneous.....	E- 13	traumatic fever.....	N- 16	of kidney.....	F- 49
stricture.....	E- 6	venomous wounds.....	N- 12	of lip.....	L- 11
Rectum and anus, diseases.....	E- 1	Surgical dressings and antiseptics.....	P- 1	of prostate.....	F- 42
Resections.....	I- 3	asepsis and antisepsis.....	P- 1	surgical.....	M- 1
ankle and foot.....	I- 4	bandages.....	P- 24	Typhlotomy, temporary.....	C- 23
ilium.....	I- 6	drainage.....	P- 18	Ureters, surgical diseases.....	F- 42
knee.....	I- 3	dressings.....	P- 23	catheterism.....	F- 43
scapula.....	I- 5	haemostatics.....	P- 14	fistula.....	F- 43
shoulder.....	I- 5	knives and forceps.....	P- 23	grafting.....	F- 44
Rhinoplasty.....	L- 15	needle-holders.....	P- 23	ureteritis.....	F- 42
Rickets.....	H- 37	suture-needle.....	P- 22	Urethra, surgical diseases.....	F- 18
Sacro-iliac disease.....	H-8; I- 16	sutures.....	P- 22	calculi.....	F- 18
Salivary glands, surgical diseases.....	L- 10	tables.....	P- 23	fistula.....	F- 25
calculus.....	L- 10	Surgical mycoses (see Mycoses).....	M- 1	gonorrhœa.....	F- 19
dermoid cyst.....	I- 10	Syphilis.....	G- 1	infectious pyæmia.....	F- 18
ranula.....	L- 10	chancre.....	G- 22	instruments.....	F- 27
tumor.....	L- 11	extra-genital chancres.....	G- 26	polypus.....	F- 19
Sarcoma.....	M- 19	chancroid.....	G- 51	rupture.....	F- 25
Scapula, excision.....	I- 5	treatment.....	G- 52	stricture.....	F- 23
Sciatica, surgical treatment.....	A- 68	diagnosis.....	G- 11	suppuration of Cooper's gland.....	F- 18
Scoliosis.....	H- 7	hereditary.....	G- 14	traumatism.....	F- 25
Scorpion-bites.....	N- 15	historical.....	G- 1	ulceration.....	F- 19
Scrotum, surgical diseases.....	F- 11	icterus caused by.....	G- 41	urethritis.....	F- 21
phlegmon.....	F- 11	localization.....	G- 8	gouty.....	F- 5
varicocele.....	F- 11	blood.....	G- 39	Varices.....	K- 23
Seminal vesicles.....	F- 16	bones.....	G- 14; I- 19		
Shock, surgical.....	P- 17	cerebro-spinal system.....	G- 9, 37		
Shoulder, amputation at.....	I- 2	kidney.....	G- 8, 31		
dislocation.....	J- 4	mouth.....	G- 29		
resection.....	I- 5	nasal cavities.....	G- 15, 32		
Sigmoid flexure, volvulus.....	C- 26	penis.....	G- 36		
Singultus in hereditary syphilis.....	G- 15	skin.....	G- 21, 30		
Skin-transplantation.....	I- 28	spleen.....	G- 41		
Snake-bites.....	N- 12	teeth.....	G- 18		
Spermatic cord, torsion.....	F- 13	testicles.....	G- 8, 16		
Spermatorrhœa.....	F- 16	prevention.....	G- 13		
Spina bifida, surgical treatment.....	H- 10	primary lesion.....	G- 22		
Spinal cord, concussion.....	O- 1	re-infection.....	G- 25		
Spine, surgery of.....	A- 60	secondary.....	G- 28		
caries.....	A- 65	tertiary.....	G- 32		
fracture.....	A- 60	tobacco and.....	G- 40		
injuries.....	A- 65	treatment, general.....	G- 42		
gunshot wounds.....	A- 65	of buboes.....	G- 52		



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1061. Archives d'électricité médicale, Bordeaux.
1062. Revista de Higiene, Bogotá.
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1064. The Corpuscle, Chicago.
1065. Florida Medical and Surgical Reporter.
1066. La Revista Médico-Quirúrgica, New York.
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1114. Gaceta Medica Municipal, Havana.
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1119. Medicinische Novitäten, Leipzig.
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2044. Morrow's System of Genito-Urinary Diseases, Syphilology, and Dermatology.
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